PROPERTY OF CENTRAL DIVISION PLANT - MARION

MODEL TTS 76

DIALED NUMBER DISPLAY

Unit # 47

NORTHEAST ELECTRONICS CORPORATION

P.O. BOX 649 – CONCORD, N.H. 03301

(603) 224-7466

MODEL TTS 76

DIALED NUMBER DISPLAY

Serial # 42

T-8270

Issue #2

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SECTION 1

DESCRIPTION & SPECIFICATIONS

1.1 GENERAL. The Model TTS 76 Dialed Number Display provides a means for displaying the digits which are transmitted on a telephone circuit in the process of generating a telephone call. Up to 14 digits can be displayed on one plane, in-line readouts, utilizing a rear projection principle for clarity over wide viewing angles and under high ambient light conditions.

1.2 The unit may be equipped to accept the many modes of signaling used in the telephone industry. A function switch conditions the internal circuits to accept the following AC and DC signaling:

a. Loop Terminating.
b. Loop Bridging
c. Touch Tone bridging (high impedance)
d. E - ground and open
e. M - battery and ground, or battery and open
f. SF - single frequency, terminating or bridging
g. MF - multifrequency, terminating or bridging. Lamps are provided for displaying the KP and ST signals.

1.3 The modes of operation and impedances are as follows:

Function Switch Position	Bridging	Terminating
1. LOOP TERM		400Ω "A" relay
*2. LOOP BRIDGE	100,000Ω	
*3. TT	100,000Ω	
4. E (G&O)	100,000Ω	
5. M (B&G or B&O)	100,000Ω	
6. SF	100,000Ω	600Ω DC blocked**
7. MF	100,000Ω	600Ω, DC blocked**

1.4 A panel meter and input level controls are provided to match the sensitivity of the TTS 76 circuits to the levels of the SF, MF, or TT signals, The input level controls are adjusted to obtain a center scale reading on the panel meter. After this level adjustment has been accomplished, the approximate level of the input signal may be read directly from the input level controls.

*On TTS 76A Loop Bridge and TT are one setting. Unit will accept either type of signaling.

** 900Ω on TTS 76A

1.5 An audible monitor is provided for both 2-wire and 4-wire circuits. This monitor is equipped with independent volume controls for each channel, and a speaker with jacks in parallel for external monitoring.

1.6 Internal circuits are extended to an external adapter plug so that the TTS 76 may be used in conjunction with an external printout device when a permanent record of the display is required. The individual detector circuits are also extended to this plug so that the connection of a multichannel recorder for monitoring the individual frequencies as received may be used.

1.7 The TTS 76 is designed to operate from a well-filtered 48V dc source and requires a maximum of 4 amperes of current. The unit is housed in a portable steel carrying case and weighs approximately 75 lb; it measures 23"w x 19"d x $13\frac{1}{4}$"h.

SECTION 2

OPERATING INSTRUCTIONS

2.1 INITIAL PREPARATION

2.2 Procedure

a. AC POWER

1. Connect the set to 120V ac using the power cord supplied with the set.

2. Observe that the fan operates by momentarily operating the ON key on the panel of the set. If this lamp does not light or becomes extinguished, check the fuse directly below on the front panel.

NOTE

The set must not be used if the fan is not operating.

b. DC POWER

1. A 48-volt dc source is required, which is capable of providing at least 4 amperes without causing more than a 2-volt drop in voltage at the set due to office wiring to the outlet.* For connecting power to the set, a 2-conductor cord with 16-gauge stranded copper conductors connected tip and sleeve on the end toward the set in a 310-type plug is required. The tip of the plug should be connected to 48 volts (-) and the sleeve to ground.

2. Operate the POWER ON key on the panel and note that the green lamp (just above the fuse) lights, indicating that power is applied to the set.

3. Momentarily depress the RESET button to clear any internal circuits which may have remained operated.

c. TEST PREPARATION

1. Determine the type of supervision required for the particular facility to be observed and set the SIG MODE SELECTOR at the appropriate position.

*A portable power supply such as the NEC Model PS104 is recommended.

2. Individual procedures are given for the following types of operation.

a. Loop Signaling terminated (LOOP TERM)
b. Loop Signaling bridging (LOOP BRDG)
c. E&M signaling bridging on the E lead (BRDG E)
d. E&M signaling bridging on the M lead (BRDG M)
e. "Single frequency" signaling (SF).
f. "Multifrequency" signaling (MF).
g. Touch tone (touch calling, etc.) signaling (TT).

The AUTOMATIC position has not been assigned and cannot be used as a setting.*

2.3 INDIVIDUAL PROCEDURES

a. LOOP TERM (loop signaling terminated). This operation places an A relay across the tip and ring of the L1 jack of the set.

NOTE

When the SIG MODE SELECTOR is in this position, do not connect to a circuit which is in service (busy circuit) as this would place the winding of the A relay across the tip and ring conductors of the circuit.

b. For this mode of operation, the BRDG/TERM toggle switch should be in the BRDG position. This switch is located on the front of sub-panel. This may be reached by lifting the cover or by swinging the front hinged panel forward.

2.4 PROCEDURE

a. Set the SIG MODE SELECTOR at LOOP TERM.

b. With a 2-conductor (or 3-conductor) cord having a 310-type plug on the end toward the set, connect the tip and ring of the circuit under test to the L1 jack of the set. The lighting of the LP lamp indicates an off-hook condition and this lamp will follow any digits dialed.

*Not applicable on 76A

c. The set is now ready to display the digits as dialed.

d. For this mode of operation, the PRE DIGIT ABOSRBED switch (on the front of the sub-panel) normally should be in position 1. This position allows one transition from on-hook to off-hook supervision before the first digit can be displayed. If it is not desired to absorb the first pulse, this switch should be in position 0. Or, if it should be desired to absorb two initial pulses or transitions, this switch should be placed in position 2. After this switch has been changed, it is necessary to depress the RESET button before pulsed numbers are to be displayed to avoid a wrong display.

e. The display of the dialed number will remain until the RESET button has been depressed. Therefore, this buttom must be depressed prior to the reception of the next dialed number.

NOTE

If this button is not depressed before the next number is received (whether the same number or a different one), an erroneous display will result after it is received.

f. If the monitor amplifier has been incorporated into the set, tones on the circuit under observation may be monitored by placing the MONITOR CHANNEL switch in position 1 and advancing the associated VOL control to the desired level of volume. Two jacks are provided to obtain the output of this amplifier; one of which provides speaker cut-off. These jacks accept a 310-type plug with the receiver connected to the tip and ring.

g. Both channels can be monitored simultaneously or separately by appropriate operation of the MONITOR CHANNEL switch. Individual volume controls are provided for each channel.

h. The LOOP-MON jack (310 type plug) provides DC LOOP supervision for monitoring or recording purposes. Connection to this jack should be made to the tip. In the off-hook condition ground will be present on this tip and 48V battery through the LP lamp for on-hook.

i. The INPUT LEVEL, TR-REV and ZERO ADJ controls serve no function in this mode of operation.

2.5 LOOP BRDG (Loop signaling, bridging). High impedance monitoring of a loop circuit is provided by placing the SIG MODE SELECTOR switch in the

the LOOP BRDG position.

NOTE

The BRDG/TERM switch on the front of the sub-panel must be in the BRDG position for this mode of operation. Otherwise, 600Ω in series with 2μF is bridged across the tip and ring of the circuit observed.

a. Procedure

1. Set the SIG MODE SELECTOR switch at LOOP BRDG.

2. With a 2-conductor (or 3-conductor) cord, having a 310 type plug on the end toward the set, connect the circuit under test to the L1 jack of the set. The lighting of the LP lamp indicates an off hook condition and this lamp will follow digits as dialed. If the LP lamp fails to light, with an off-hook condition, turn the TR-REV turnbutton to its alternate position. In this position, the LP lamp should light and follow digits as dialed.

3. Connect central office ground to grounding terminal on the set. If a portable 48V source is used, such as the NEC PS104, the positive (+) terminal must also be connected to central office ground.

4. The set is now ready to display the digits as dialed.

5. For this mode of operation, the PRE DIGIT ABSORBED switch (on the front of the subpanel), normally should be in position 1. This position allows one transition from on-hook to off-hook supervision before the first digit can be displayed. If it is not desired to absorb the first pulse, this switch should be in position 0. Or, if it should be desired to absorb two initial pulses or transitions, this switch should be placed in position 2. After this switch has been changed, it is necessary to depress the RESET button before pulsed numbers are to be displayed to avoid a wrong display.

6. The display of the dialed number will remain until the RESET button has been depressed, therefore, this button must be depressed prior to the reception of the next dialed number.

NOTE

If this button is not depressed before the next number is received (whether the same number or a different one), an erroneous display will result after it is received.

7. The operation of the monitor amplifier is identical with its operation for loop terminating and is covered in paragraph 2.4.

8. The LOOP-MON jack (310-type plug) provides dc loop supervision for monitoring or recording purposes. Connection to this jack should be made to the tip. In the off-hook condition ground will be present on this tip and 48V battery through the LP lamp for on-hook.

9. The INPUT LEVEL and ZERO ADJ controls serve no function in this mode of operation.

2.6 BRDG E (Bridging on the E Lead). In making a bridging test on the E lead, it is important to make sure that there is no interruption to the continuity of the E and M leads at the point at which these leads are to be picked up for test. A through connection for these leads is provided between the LINE and DROP jacks to the set. Patching should be done from the set to the circuit in order to avoid interruption. However, where jack fields are not available, a bridging conductor may be taken from the tip of either the LINE or the DROP jack of the set to the E lead of the circuit be monitored. The set provides a bridging impedance in excess of 100,000Ω.

2.7 Procedure

a. In this mode of operation, set the SIG MODE SELECTOR at BRDG E.

b. Plug a 4-conductor (or 6-conductor) cord, having twin 310-type plugs on the end toward the set, into the LINE and DROP jacks of the set.

c. After this connection is established, plug the other end (in this sequence) into the signaling line and drop jacks of the circuit under test. As covered in paragraph 2.6, a single conductor cord may be bridged onto the E lead in place of steps a and b.

d. In this mode of operation, the L1 and L2 jacks of the set connect the inputs of the dual channel monitoring circuits only and may be bridged onto the voice path of the circuit under test for audible monitoring purposes. The bridging impedance of the input circuits of the dual channel

monitor circuits is in excess of 100,000Ω each. The operation of the monitor circuits is given in paragraph 2.4.

e. The E lamp should light for the off-hook condition and should follow the signaling pulses. The same holds true for the M lamp if this part of the signaling circuit has been brought through the set.

f. The INPUT LEVEL, TR-REV and ZERO ADJ controls serve no function in this mode of operation.

g. For this mode of operation the PRE DIGIT ABSORBED switch (on the front of the sub-panel) normally should be in position 1. This position allows one transition from on-hook to off-hook supervision before the first digit can be displayed. If it is not desired to absorb the first pulse, this switch should be in position 0. If it should be desired to absorb two initial pulses or transitions, this switch should be placed in position 2. After this switch has been changed, it is necessary to depress the reset button before pulses numbers are to be displayed to avoid a wrong number.

h. The number dialed will be displayed, and the display will remain until the RESET button has been depressed. Therefore, this button must be depressed prior to the reception of the next dialed number.

NOTE

If this button is not depressed before the next number is received, (whether the same number or a different one) an erroneous display will result after it is received.

2.8 BRDG M (bridging on the M lead). In making this test, it is important to make sure that there is no interruption to the continuity of the E and M leads at the point at which these leads are to be picked up for test. A through connection for these leads is provided between the LINE and DROP jacks of the set. Patching should be done from the set to the circuit in order to avoid interruption. However, where jack fields are not available, a bridging conductor may be taken from the ring of either the LINE or DROP jack of the set to the M lead of the circuit to be monitored. The set provides a bridging impedance in excess of 100,000Ω.

a. Procedure

1. Set the SIG MODE SELECTOR at BRDG M.

2. Plug a 4-conductor (or 6-conductor) cord, having twin 310-type plugs on the end toward the set into the LINE and DROP jacks of the set.

3. After this connection is established, plug the other end (in this sequence) into the signaling line and drop jacks of the circuit under test. As covered in paragraph 2.6, a single conductor cord may be bridged onto the M lead in place of steps b and c.

4. Turn the SIG MODE SELECTOR to the BRDG M position and make certain that the BRDG/TERM switch on the front of the sub-panel is in the BRDG position. In this mode of operation, the L1 and L2 jacks of the set connect the inputs of the dual channel monitoring circuits only and may be bridged onto the voice path of the circuit under test for audible monitoring purposes. The bridging impedance of the input circuits of the dual channel monitor is in excess of 100,000Ω each. The operation of the monitor circuits is given in paragraph 2.4.

5. The M lamp should light for the off-hook condition and should follow the signaling pulses. The same holds true for the E lamp if this part of the signaling circuit has been brought through the set.

6. The INPUT LEVEL, TR-REV and ZERO ADJ controls serve no purpose in this mode of operation.

7. For this mode of operation, the PRE DIGIT ABSORBED switch (on the front of the sub-panel) normally should be in position 1. This position allows one transition from on-hook to off-hook supervision before the first digit can be displayed. If it is not desired to absorb the first pulse, this switch should be in position 0. Or if it should be desired to absorb two initial pulses or transitions this switch should be placed in position 2. After this switch has been changed, it is necessary to depress the RESET button before pulsed numbers are to be displayed to avoid a wrong display.

8. The number dialed will be displayed and the display will remain until the RESET button has been depressed. Therefore, this button must be depressed prior to the reception of the next dialed number.

NOTE

If this button is not depressed before the next number is received (whether the same number or a different one) an erroneous display will result after it is received.

2.9 S-F (single frequency signaling.) The set may be used for monitoring single frequency signaling pulses and displaying the numbers as pulsed. The set provides

a bridging impedance in excess of 100,000Ω. In this mode of operation, the meter and input level controls are utilized to adjust the set to the proper level of the incoming signal and to provide visual indication of the approximate level.

a. Procedure

1. Turn the SIG MODE SELECTOR to the S-F position.

2. Make certain that the BRDG/TERM switch on the front of the sub-panel is in the BRDG or TERM position, as required for the type of test to be made.

3. With a 2-conductor (or 3-conductor) cord having a 310-type plug on the end toward the set, connect the circuit under test to the L1 jack of the set.

4. Set the INPUT LEVEL controls at the value of the level expected for the pulses to be measured.

5. When signaling is received, the panel meter should read at approximately its center point. If a reading to the left of this point is observed, the input level setting should be increased (clockwise) to obtain a reading approximately at the center point on the meter. On the other hand, if the reading is to the right of the center point, the input level setting should be reduced (counter-clockwise) to obtain a reading at the center point on the meter. This may require several receptions of pulses to secure proper adjustment. Between each reception the RESET button must be depressed so as to reset the meter circuit.

6. For this mode of operation, the PRE DIGIT ABSORBED switch (on the front of the sub-panel), normally should be in position 1. This position allows one transition from on-hook to off-hook supervision before the first digit can be displayed. If it is not desired to absorb the first pulse, this switch should be in position 0. If it should be desired to absorb two initial pulses or transitions, this switch should be placed in position 2. After this switch has been changed, it is necessary to depress the RESET button before pulsed numbers are to be displayed.

NOTE

If this button is not depressed before the next number is received (whether

the same number or a different one), an erroneous display will result after it is received.

7. The TR-REV turnbutton has no function in this mode of operation.

8. The number which has been pulsed will be displayed and remain displayed until the RESET button has been depressed. Therefore, this button must be depressed prior to the reception of the next dialed number.

9. The SF lamp should light to show a TONE OFF condition (lamp out signifying TONE ON) and this lamp will follow the signaling pulses as received.

10. The monitor amplifier is available for this mode of operation as covered in paragraph 2.4.

11. The SF-MON jack is available for use with recording apparatus such as pen recorders. Connection should be made between the tip of this jack and ground and the output is ground for battery through 2000Ω.

2.10 M-F (multifrequency signaling). The set may be used for monitoring multifrequency signaling pulses and displaying the numbers so pulsed. The set provides a bridging impedance in excess of 100,000Ω. In this mode of operation, the meter and input level controls are utilized to adjust the set to the proper level of the incoming signal and to provide a visual indication of the approximate level.

a. Procedure

1. Turn the SIG MODE SELECTOR to the M-F position.

2. Make certain that the BRDG/TERM switch on the front of the sub-panel is in the BRDG or TERM position as required for the type of test to be made.

3. With a 2-conductor (or 3-conductor) cord, having a 310-type plug on the end toward the set, connect the circuit under test to the L1 jack of the set.

4. Set the INPUT LEVEL controls at the value of the level expected for the pulses to be measured.

5. When signaling is received, the panel meter should read at approximately its center point. If a reading to the left of this

point is observed, the input level setting should be increased (clockwise) to obtain a reading approximately at the center point on the meter. On the other hand, if the reading is to the right of the center point, the input level setting should be reduced (counter-clockwise) to obtain a reading at the center point on the meter. This may require several receptions of pulses to secure proper adjustment. Between each reception, the RESET button must be depressed to reset the meter circuit.

6. The PRE DIGIT ABSORBED switch, on the front of the subpanel, must be in position 0. for this mode of operation. After this switch has been changed, the RESET button must be depressed to avoid an erroneous display. The TR-REV turnbutton is not effective in this mode of operation.

7. The number which has been pulsed will be displayed and will remain displayed until the RESET button has been depressed. Therefore, this button must be depressed prior to the reception of the next dialed number.

8. The operation of the monitor amplifier is covered in paragraph 2.4.

9. To display the condition of the E and M leads of the circuit on the E and M lamps of the set, plug a 4-conductor (or 6-conductor) cord with twin 310-type plugs on the end toward the set, into the LINE and DROP jacks of the set.

10. After this condition is established, plug the other end (in this sequence) into the signaling line and drop jacks of the circuit under test. However, where jack fields are not available, bridging conductors may be taken from the tip and ring of either the LINE or DROP jack of the set to the E and M leads, respectively, of the circuit to be monitored.

11. For this mode of operation, the E-MON and M-MON jacks are available to operate an external recording device, such as a pen recorder. In the on-hook condition, battery is present on the tips of these jacks through the respective E and M lamps. In the off-hook condition, ground is present on the tips of these jacks.

2.11 TT (Touch tone, touch calling, etc. signaling). The set may be used for monitoring touch tone signaling pulses and displaying the numbers as pulsed. The set provides a bridging impedance in excess of 100,000Ω. In this mode of operation, the meter and input level controls are utilized to

adjust the set to the proper level of the incoming signal and to provide an approximate visual indication of this level.

a. Procedure

1. Turn the SIG MODE SELECTOR to the TT position.

2. Make certain that the BRDG/TERM switch on the front of the sub-panel is in the BRDG or TERM position as required for the type of test to be made (the internal termination is 600Ω + 2μF).

3. With a 2- or 3-conductor cord, having a 310-type plug on the end toward the set, connect the circuit under test to the L1 jack of the set. The LP lamp should light for an off-hook (dark for on-hook) condition. If it fails to light for an off-hook condition, turn the TR-REV turnbutton to its alternate position. In this position, the LP lamp should light to indicate an off-hook condition.

4. Set the INPUT LEVEL controls to the value of the level expected for the TT pulses to be measured.

5. When signaling is received, the panel meter should read at approximately its center point. If a reading to the left of this point is observed, the input level setting should be increased (clockwise) to obtain a reading approximately at the center point on the meter. On the other hand, if a reading is to the right of the center, the input level setting should be reduced (counter-clockwise) to obtain a reading at the center point on the meter. This may require several receptions of pulses to secure proper adjustment. Between each reception, the RESET button must be depressed so the meter circuit will reset.

6. The PRE DIGIT ABSORBED switch on the front of the sub-panel must be in position 0 for this mode of operation. After this switch has been changed, the RESET button must be depressed to avoid an erroneous display.

7. The number which has been pulsed will be displayed and will remain displayed until the RESET button has been depressed. Therefore, this button must be depressed prior to the reception of the next pulsed number.

8. The operation of the monitor amplifier is covered in paragraph 2.4.

9. The LOOP-MON jack (310-type plug) provides loop supervision for monitoring or recording purposes. Connection to this jack should be made to the tip. In the off-hook condition, ground will be present on this tip and 48-volt battery through the LP lamp for on-hook.

SECTION 3

CIRCUIT DESCRIPTION

This section will be completed at a later date.

SECTION 4

SCHEMATIC AND ASSEMBLY DIAGRAMS

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	1	ADDED STRAP ON #95085 (8-13)	2-8-67	J.S.J.
	2	ADDED P1	2-28-67	
	3	CHANGED SW 1	6-21-68	REF

S-5B ROTRON MUFFIN FAN P2

S-1 DTT / MF / SF — LOOP TERM. — LOOP BRIDGED — E M — SIG. MODE SELECTOR SW.

LEVEL METER — ZERO ADJ R-21 — PEAK DET. E-95078 — S.E. LEVEL ADJ. R-13 — S.E. DET E-95038

S-1,D-5 — S-1,D-4 — S-1,D-3 — S-1,D-2 — S-1,D-1 — S-2,D-1 — S-2,D-2 — S-2 — S-3 TERM / BRIDG — S-4 — S-5A — S-9 MON CKT

2 CHANNEL MONITOR AMP. A-1128

TR-REV — DC. BRIDGING CKTS E-95077

SCAN PULSE GEN. E-95082 — PRE-DIGIT ABSORBED SW. — DIGIT COUNTER BD QUAD FLIP FLOP E-95083 — QUAD FLIP FLOP E-95083 — NUMBER PROGRAMING B/D CONVERTER E-95080 — DIGIT PROGRAMING GATES B/D CONVERTER E-95080 — STORAGE BDS POINT 13 — TO N.C. CONTACTS C.O. RELAY — B/D CONVERTER E-95080

TO N.O. CONTACTS OF C.O. — KEY PULSE TO DECIMAL CONVERTER E-95100 — TO QUAD FLIP FLOP BD. RESET POINTS 1-8 — PRE-DIGIT ABSORBED

700 E-95093 — 900 E-95093 — 1100 E-95093 — 1300 E-95093 — 1500 E-95093 — 1700 E-95093 — MF DETECTORS

697 E-95093 — 770 E-95093 — 852 E-95093 — 941 E-95093 — 1209 E-95093 — 1336 E-95093 — 1477 E-95093 — 1633 E-95093 — TOUCH TONE DETECTORS

ST-KP+GATE CKTS E-95091 — KP — ST — LP-5 — LP-6 — LP-7 — LP-8

SCR GATE CONTROL + 4 VOLT BIAS E-95106 — 2N1136A on Heat Sink

TO BUFFER INPUTS + SWINGERS C.O. RELAY — STORAGE 1 OF 14 E-95087 — READOUT 1 OF 14 — SEL.

SWINGERS C.O. RELAY + STORAGE INPUTS — BUFFER CKTS E-95105 — P1

PART OF P1 — REMOTE RESET — TONE RESET — ALL RESISTORS 150Ω 10W — BATT. TO POINT G READOUT 1-14

CB-1 4A IN1204 PWR — LP1 — RLY1 — CB-2 CB-3 CB-4 CB-5 CB-6 IN1007 — CB-7 CB-8 IN2069 — CB-9 IN1198 — CB-10 IN2069 — J-1 48V COMMON NEG OF UNIT

J-1 LINE — J-2 DROP — J-3 L1 — J-4 L2 — J-5 LINE — J-6 DROP — J-7 L2 — J-8 W/ S.PK. — J-9 W/I S.PK. — J-10 M MON — J-11 E MON — J-12 LOOP MON — J-13 S.F. MON

SPEAKER — POWER OFF / CHAN 1 / CHAN 1+2 / CHAN 2 — 2N2102 — 10K — 470Ω — IN2069 — R55D — PART OF P1 — EXT START — STRAP FOR DTD — STRAP DRY CONTACTS

NOTE: ALL SHIELDS GO TO +48V

LP-9 — ON / OFF S-10 — RECEIVER TEST CKT.

ITEM	REQ'D	PART NO	DESCRIPTION	MATL	MATL SPEC

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCES ON: FRACTIONS ±1/64; DECIMALS ±.005; ANGLES ±½°. ALL SURFACES. MATERIAL. FINISH. PAINT. SCREEN PER.

DRAWN K.A. SMITH 7-14-66 — APPD — ISSUED — ENGR — MFG — MATL — APPROVED / DATE

SCHEMATIC

TTS-76

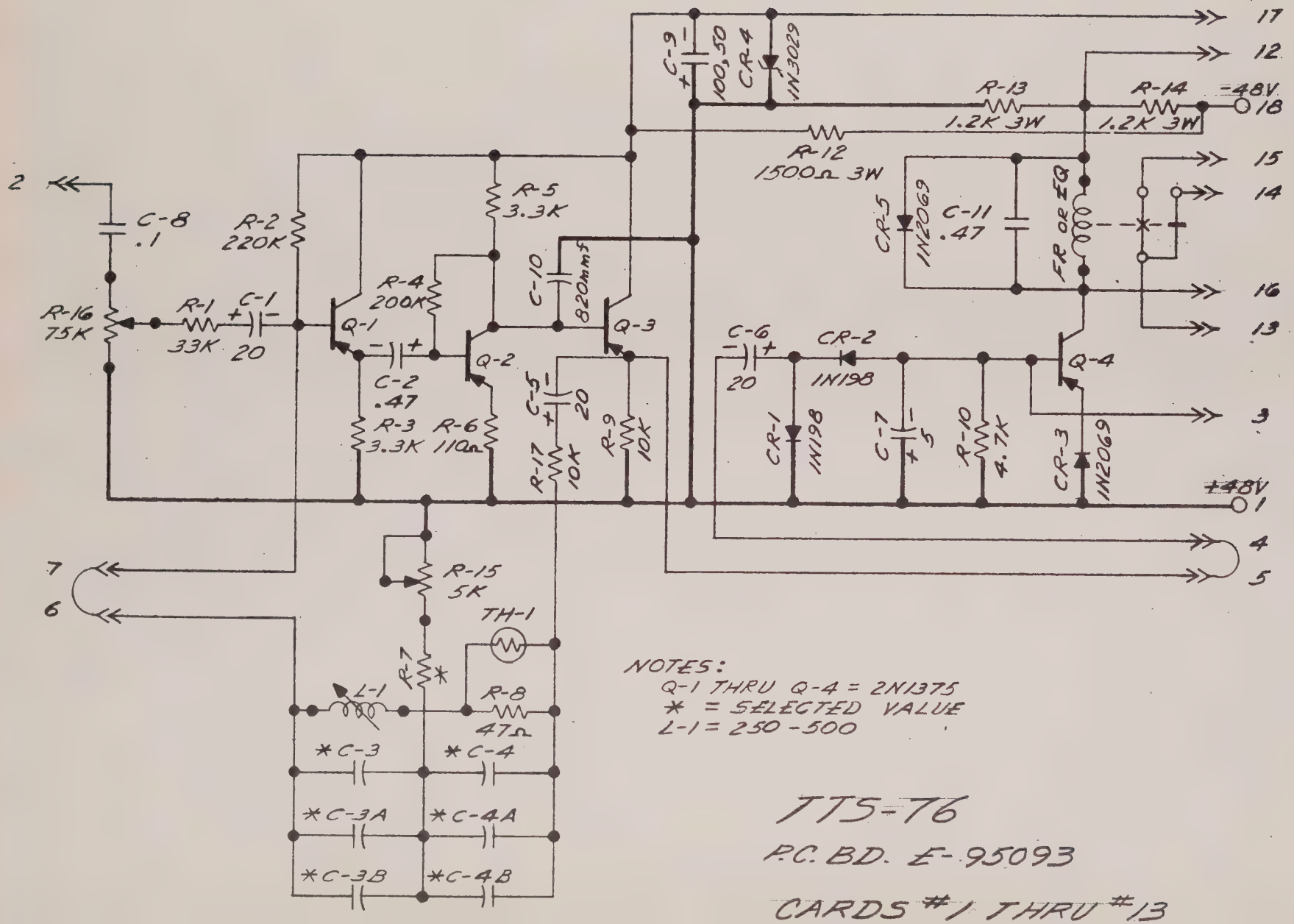
SCALE — WT CALC / ACTUAL

NORTHEAST ELECTRONICS CORP. CONCORD, N. H.

REF. NO. D-1214

SIZE D — 90185 3

CONT ON SHEET — SH NO

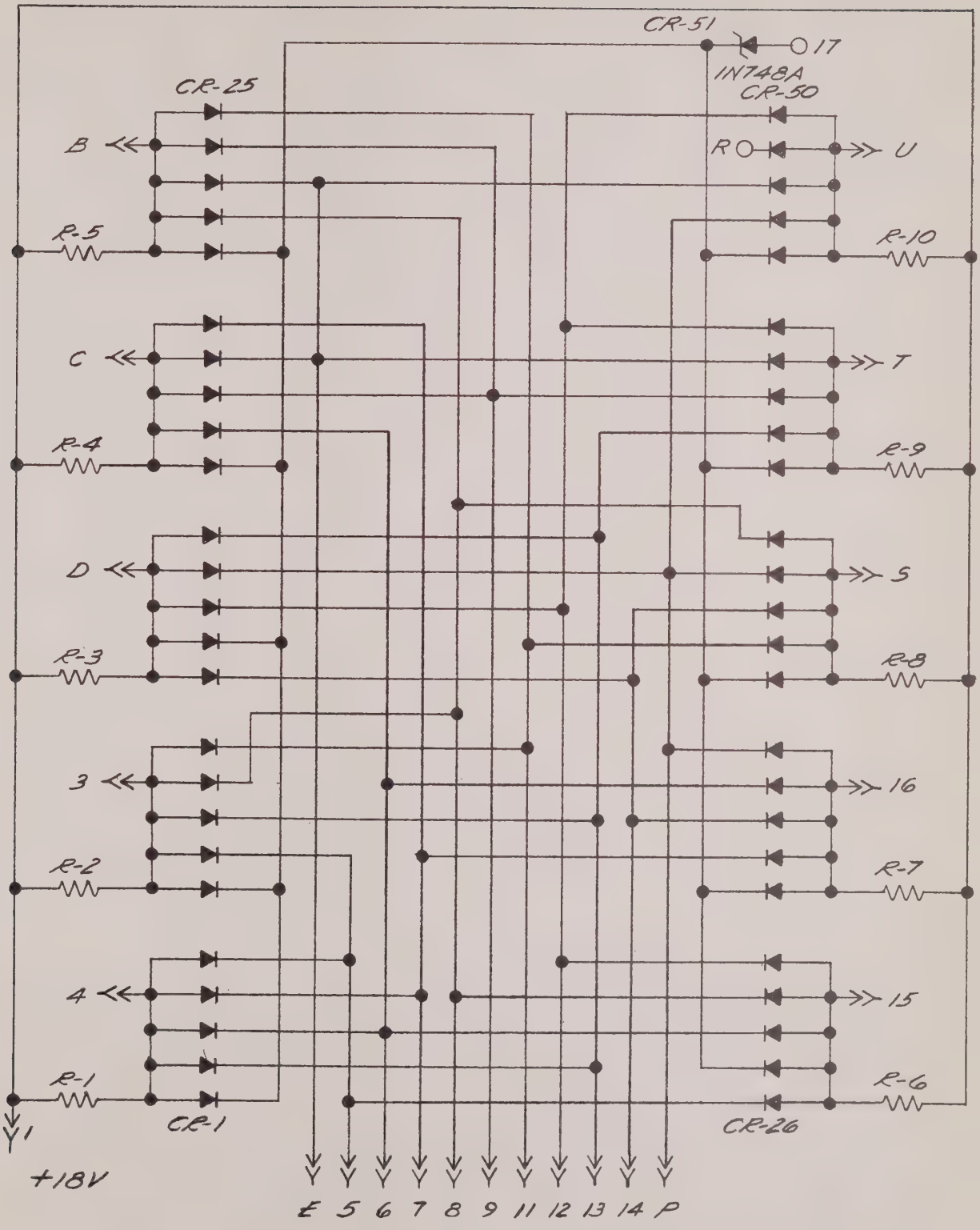


NOTES:
Q-1 THRU Q-4 = 2N1375
* = SELECTED VALUE
L-1 = 250 - 500

TTS-76

P.C. BD. E-95093

CARDS #1 THRU #13



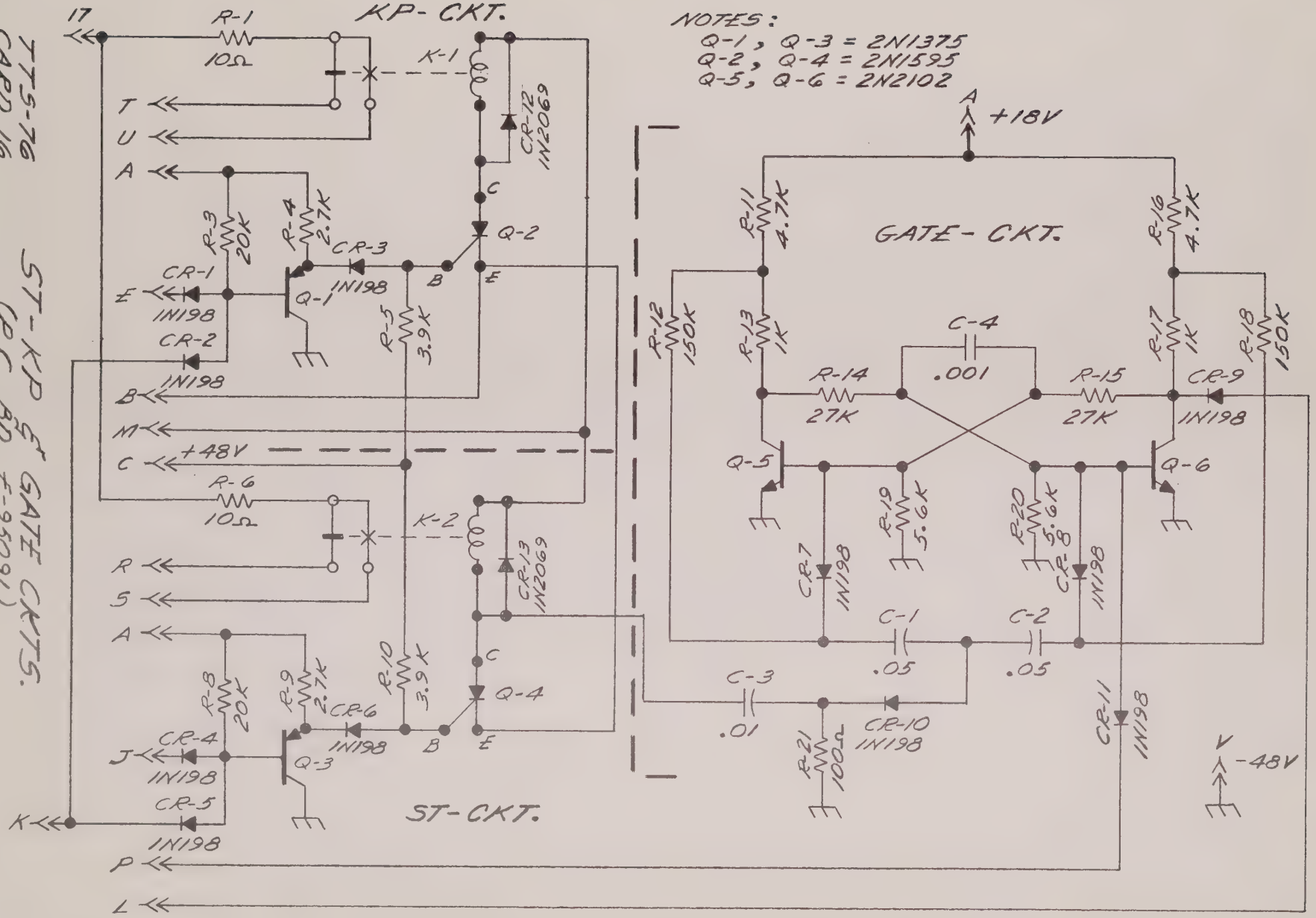
NOTES:

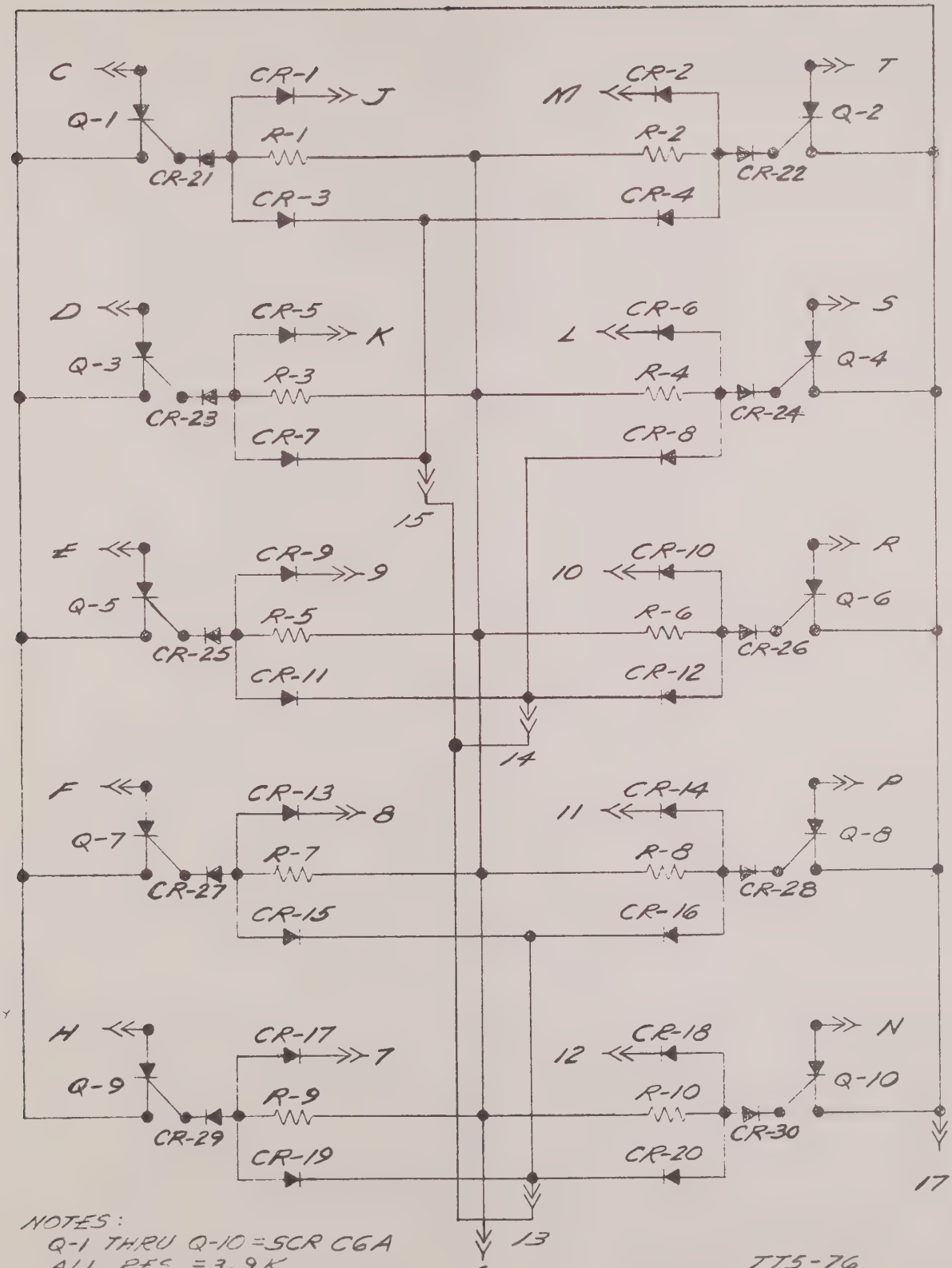
ALL RES. 2.7K ½W
ALL DIODES IN198

TTS-76
CARD 15
KEY PULSE TO DEC CONV
(P. C. BD. E-95100)

TTS-76
CARD 16

ST-KP & GATE CKTS.
(P.C. BD. #F-95091)

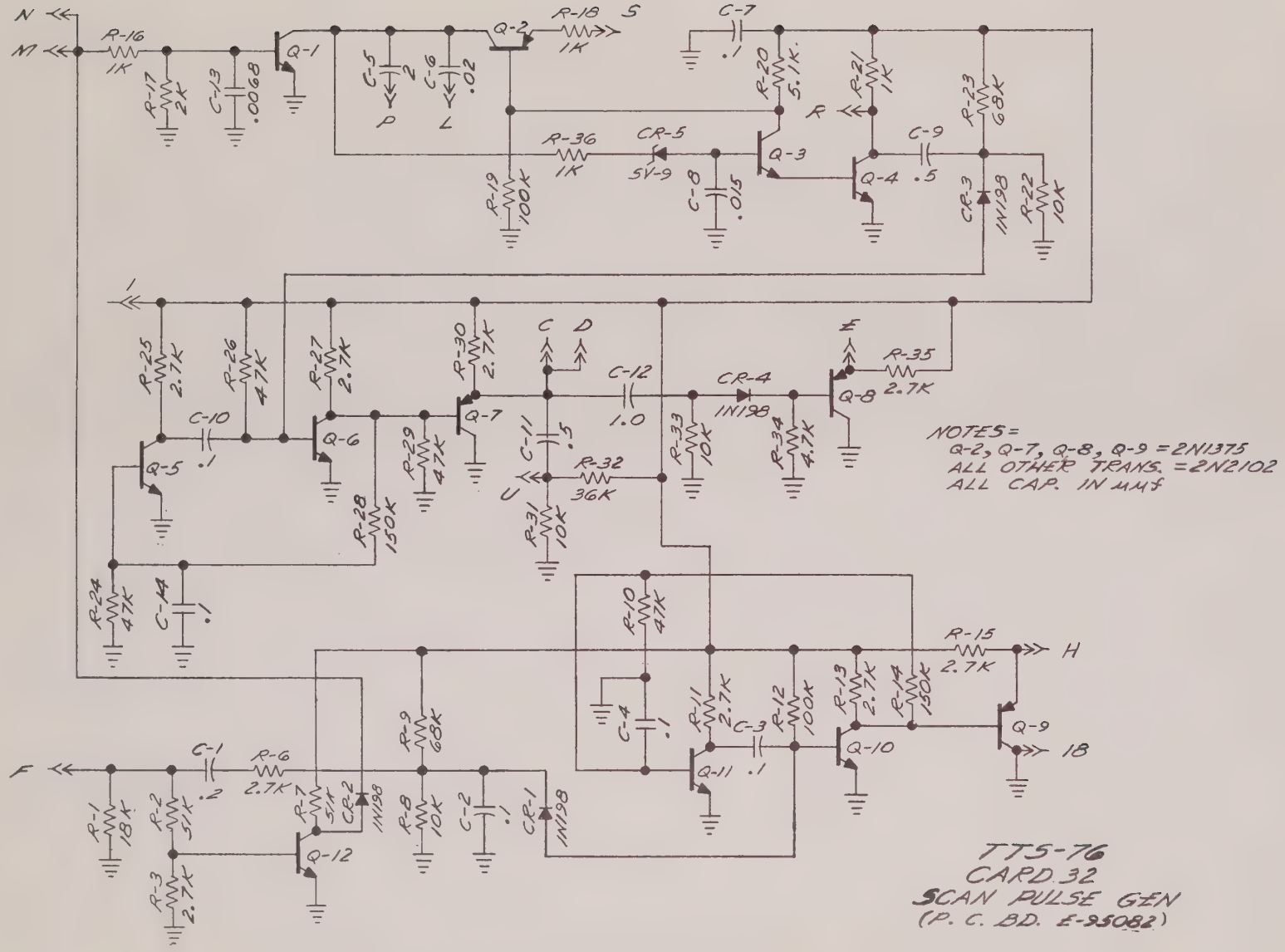




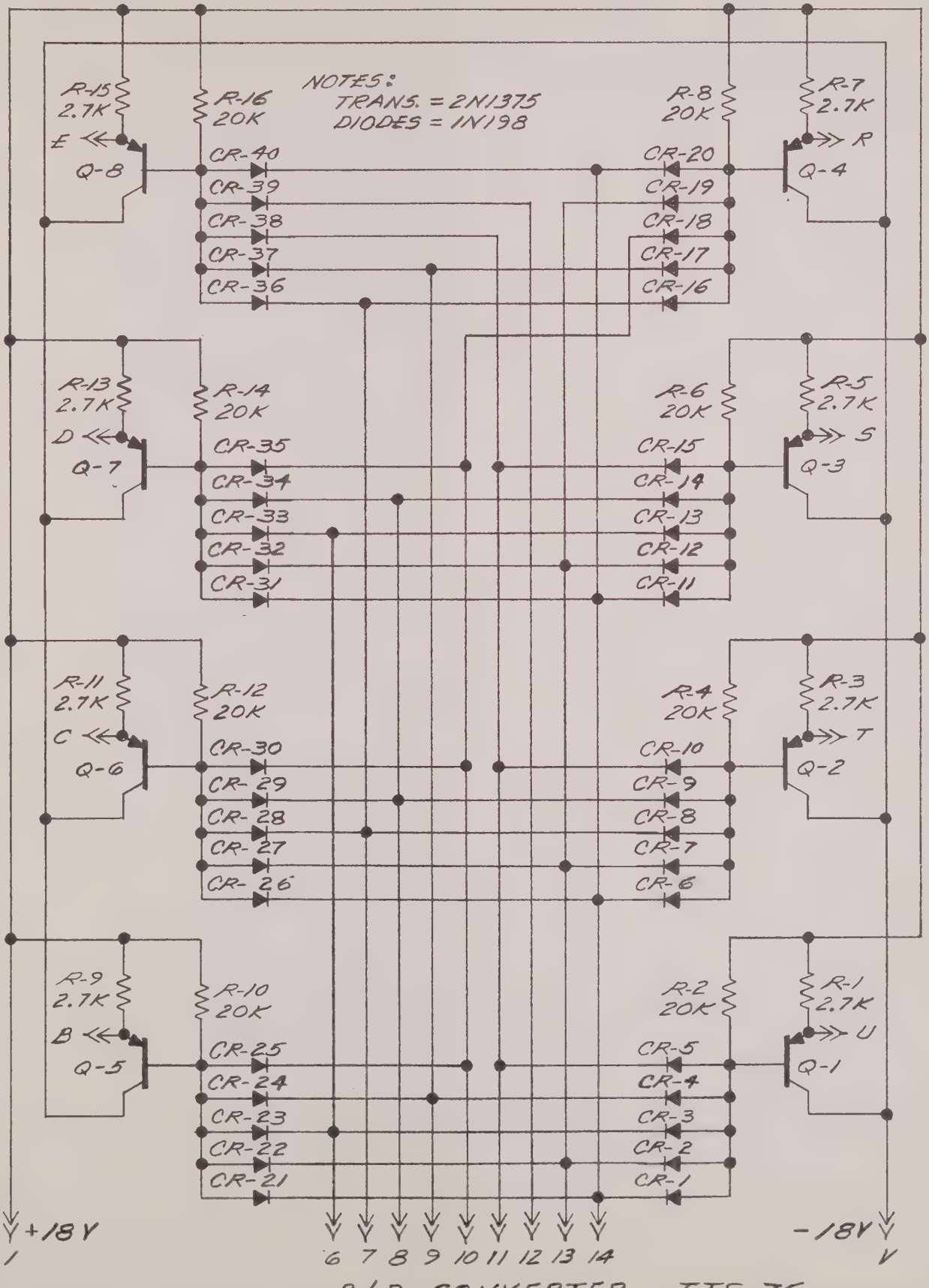
NOTES:
Q-1 THRU Q-10 = SCR C6A
ALL RES. = 3.9K
ALL DIODES = IN198

TT5-76
CARD 18 THRU 31

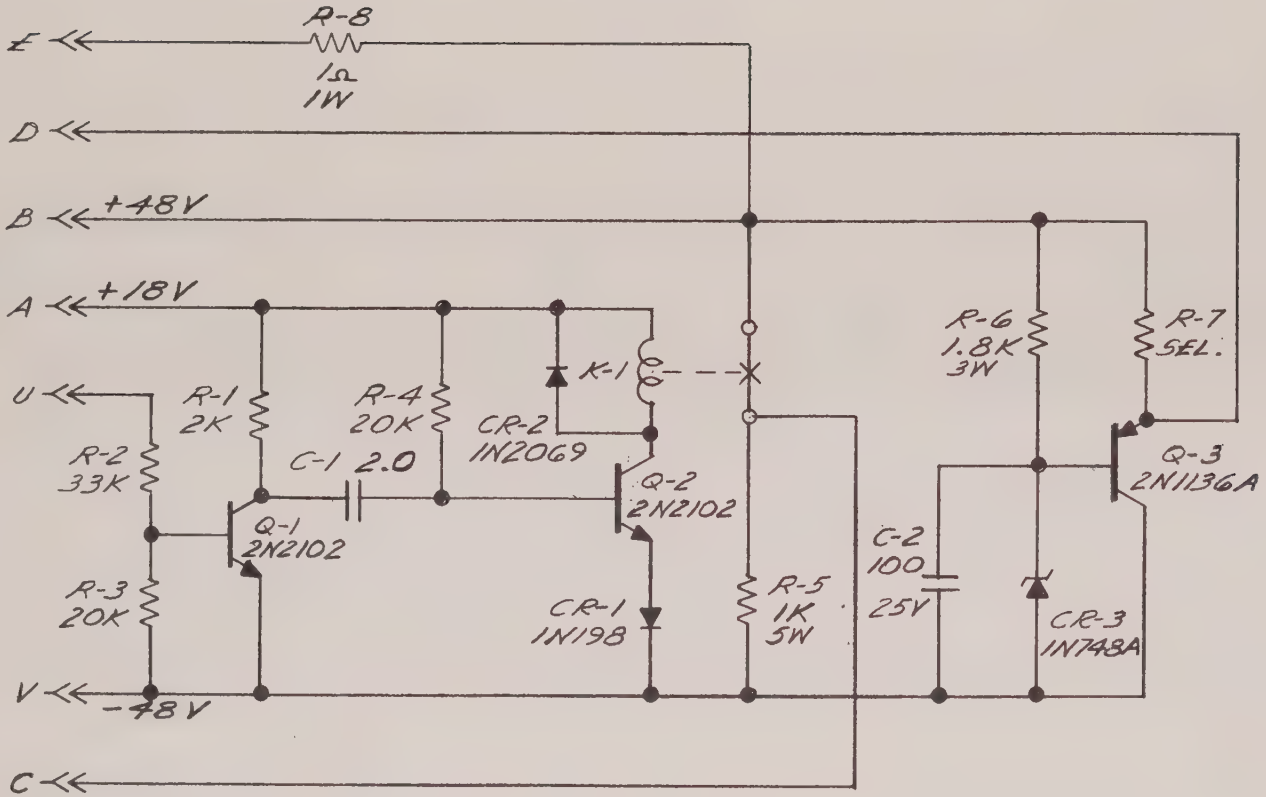
10 BIT SCR STORAGE
(P. C. BD. E-95087)


N
M
R-16 1K
R-17 2K
C-13 .0068
Q-1
C-5 2 P
C-6 .02 L
Q-2
R-18 S 1K
C-7 .1
R-20 5.1K
R-21 1K
R
R-23 68K
R-36 1K
CR-5 5V-9
Q-3
Q-4
C-9 .5
C-8 .015
R-19 100K
CR-3 IN198
R-22 10K
I
R-25 2.7K
R-26 47K
R-27 2.7K
R-30 2.7K
C D
C-12 1.0
CR-4 IN198
E
R-35 2.7K
Q-8
C-10 .1
Q-5
Q-6
Q-7
R-29 47K
C-11 .5
R-32 36K
R-33 10K
R-34 4.7K
U
R-28 150K
R-31 10K
R-24 47K
C-14 .1
R-10 47K
R-15 2.7K
H
C-4 .1
R-11 2.7K
C-3 .1
R-12 100K
R-13 2.7K
R-14 150K
Q-9
Q-10
Q-11
18
F
C-1 .2
R-6 2.7K
R-9 68K
R-1 18K
R-2 51K
R-7 51K
CR-2 IN198
R-8 10K
C-2 .1
CR-1 IN198
Q-12
R-3 2.7K
NOTES=
Q-2, Q-7, Q-8, Q-9 = 2N1375
ALL OTHER TRANS. = 2N2102
ALL CAP. IN MMF
TTS-76
CARD 32
SCAN PULSE GEN
(P. C. BD. E-95082)

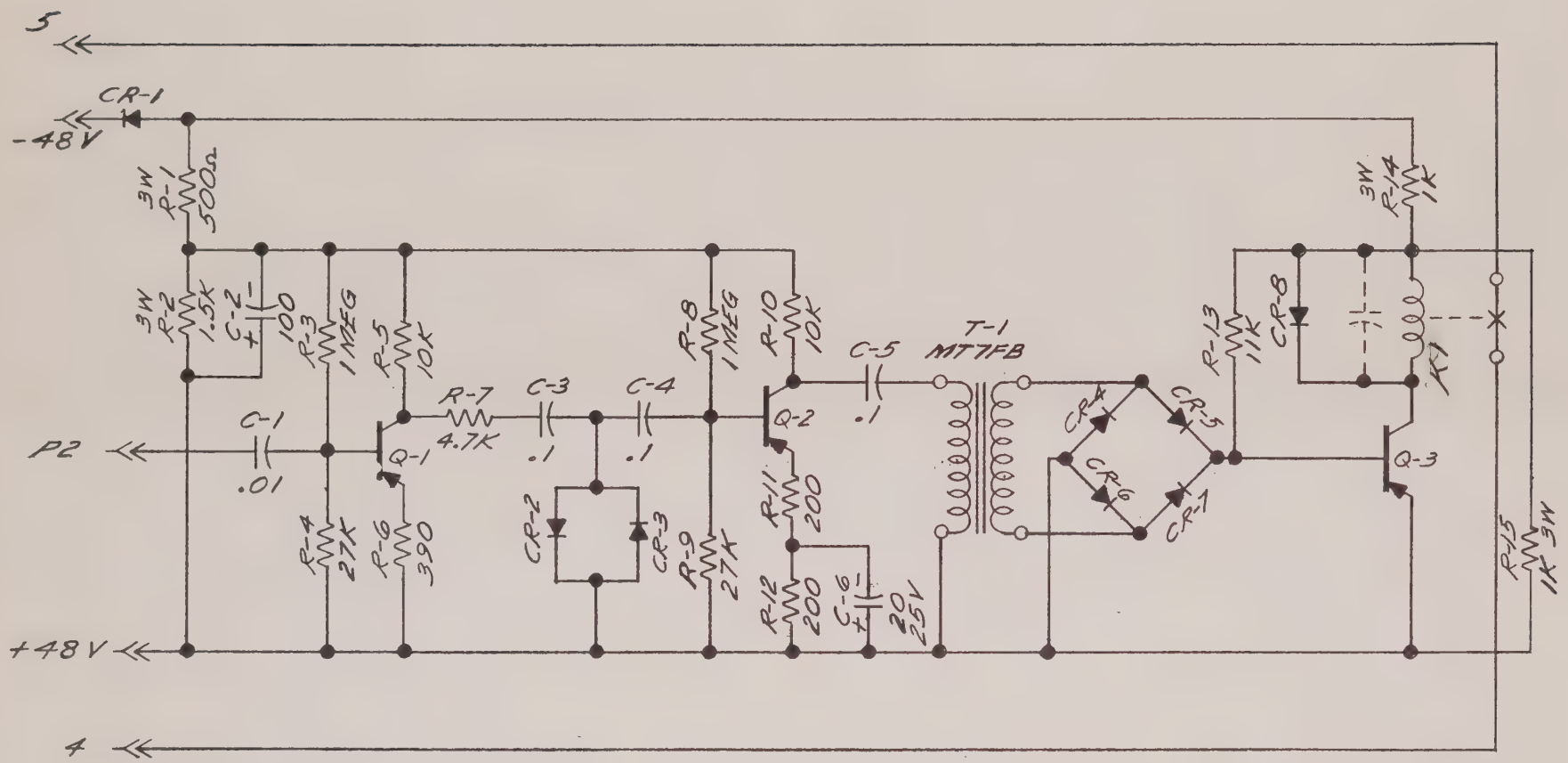
TT5-76
CARD 33, 36
QUAD FLIP FLOP
(P.C. BD. #-95083)



B/D CONVERTER TTS-76
(P.C. BD. E-95080) CARDS #34, 35, 37, 38



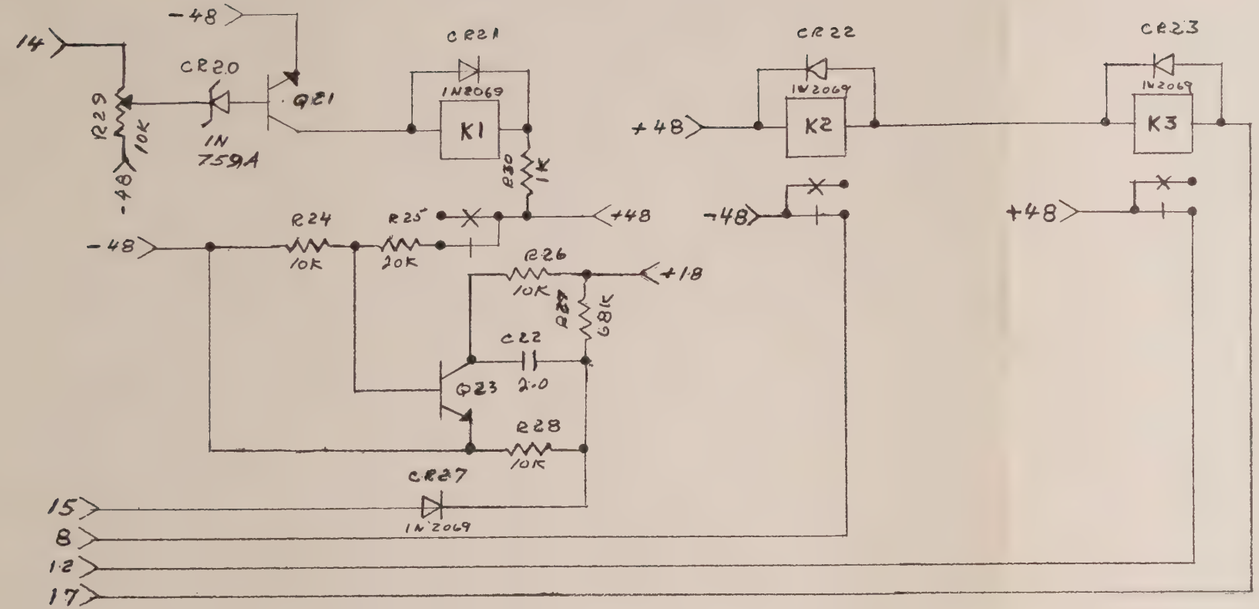
TT5-76
CARD 41
SCR GATE & 4V BIAS
(P.C. BD. E-95106)



NOTES:

ALL DIODES 1N2069
ALL TRANS. 2N1375
KI = CRZ-1056

TONE DETECTOR
MODEL TTS-76
P.C. BD. E-95038



Voltage + Switchover
Card # E-95208

Note:
All Transistors 2N2102

Relays K1-K2-K3+K4 Magnacraft 1000 ohms 24V.

Relay K5 Clareed 10000ohms 24V.

Card #39
D.C. Bridg. Ckt.

E

S

T

9

5

CR3

CR4

K1 RSSD

R1 3K

C1 20

CR1

7

Counter

1

6

CR2

R4 300Ω 3W

-48

P1

1K

R3 100 Ω

C4 200

K6 HKP 24V

CR8

K2 RSSD

K3 RSSD

CR9

CR5

R2 400Ω 3W

CR6

R5 2K

K4 RSSD

C2 200

P2 1K

R7 100 Ω

K5 HKP 24V

C3 200

CR7

10

WINK

DS-1

-48

NOTE:
Strap out R23 (50 ohm 3 watt) of E-BRIDG. ckt. Card #39. When using this ckt.

All Diodes IN2069

To Make Contact Reset Relay

1

R11 1K

C6 200

R12 2.2K

K8 RSSD

3

-48V Batt

S1-D4

R9 1K 3W

CR10

IN2992B

Q1 2N1136A

R10 5K 3W

2

+48 Gnd

40V

R14 15 Ω

R13 2K

CR11

K9 RSSD

4

DS-2

FAULT

-48

CR12

R15 1.2K

CR13

HKP 24V

K7

C5 20

R8 100 Ω

R16 500Ω 3W

24V to 36V

R17 1K 3W

K10 RSSD 12V

CR14

Q2 2N4354

R18 2K

C7 200

R19 4.3K

12V RSSD

K11

ANS.

DS-3

8

P3 50K

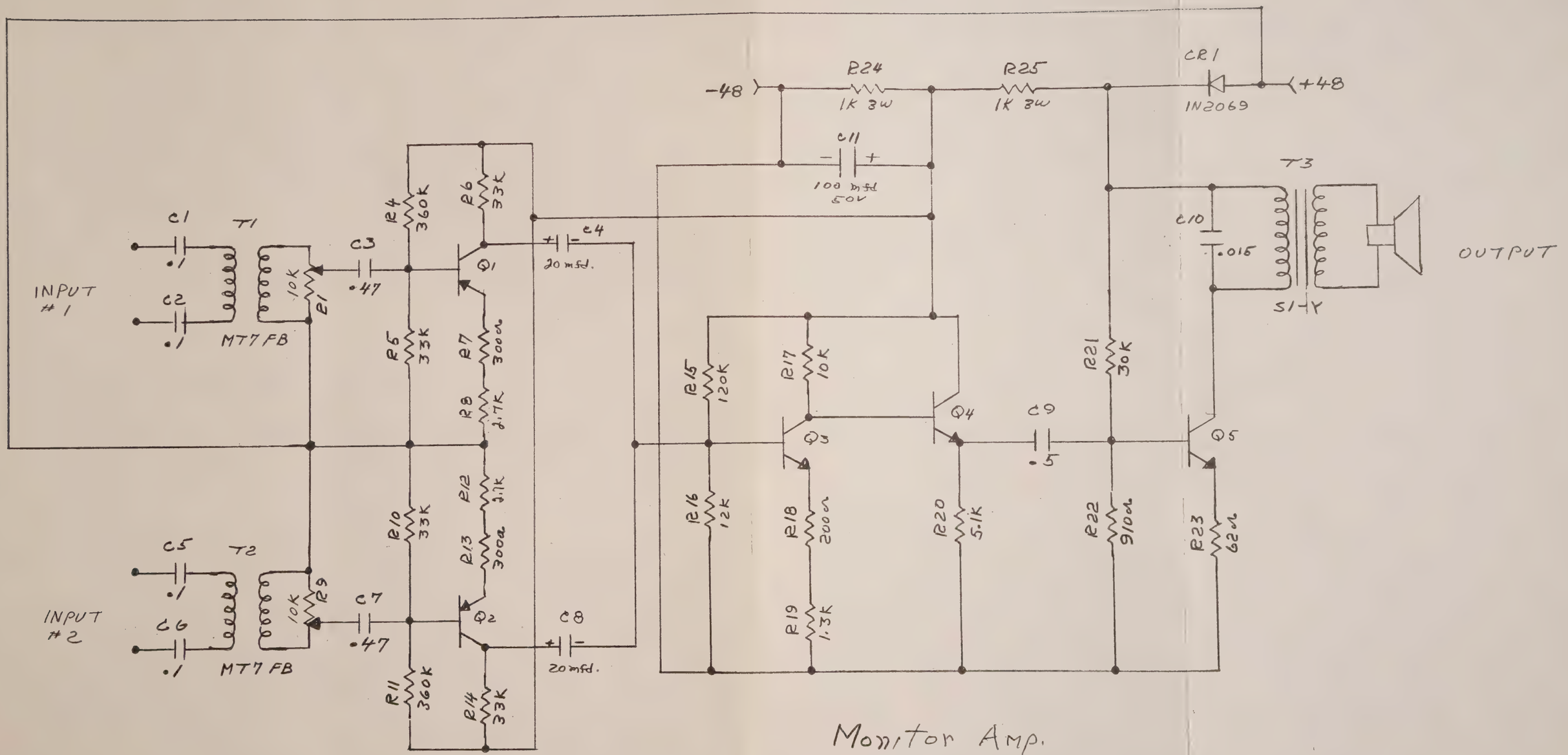
TTS-76A
WINK-ANSWER-FAULT CIRCUIT
DWN. BY RSH
ENG. DLK
1-4-68

C2 100 +/- 50v
CR-1
IN3029
R7 2.5K 3W
R11 2.5K 3W
R12 2.5K 3W
C6 100 +/- 50v
N
U
T
K
L
P
R
S
R13 3K
R2 120K
R5 10K
Q1
Q2
C1 .1
C
B
TO ALL GNDS.
C4 .1
CR-2 IN695
Q3
Q4
M
R1 12K
R4 820Ω
R3 1.2K
C3 20-25v
R6 4.7K
R8 10K
C5 4.0-150v
R9 20K
R10 2K
R15 Sel.
R22 1K
R14 Sel.
P2 400Ω
R16 5.1K
R18 47K
R30 5K
C7 .1
R19 1K
R17 47K
R20 1.5K
C9 510 PF
IC-1
C11 .47
C10 22 PF
R24 1 Meg.
R21 220K
Q6
Q7
R27 100K
C14 20-25v
C15 20-25v
R25 2.2K
VR-2 5V1
VR-1 5V1
R26 100K
R28 4.7K
C8 20-25v
Q5
R23 5.6K
CR-3 IN198
C13 .012
R31 10K
R22 560K
C12 .1
CR-4 IN198

NOTES:

Q1-Q2-Q7	2N1375
Q3 F.E.T.	2N2606
Q4	2N3638
Q5-Q6 F.E.T.	MPF 103
IC-1	TOA 2709

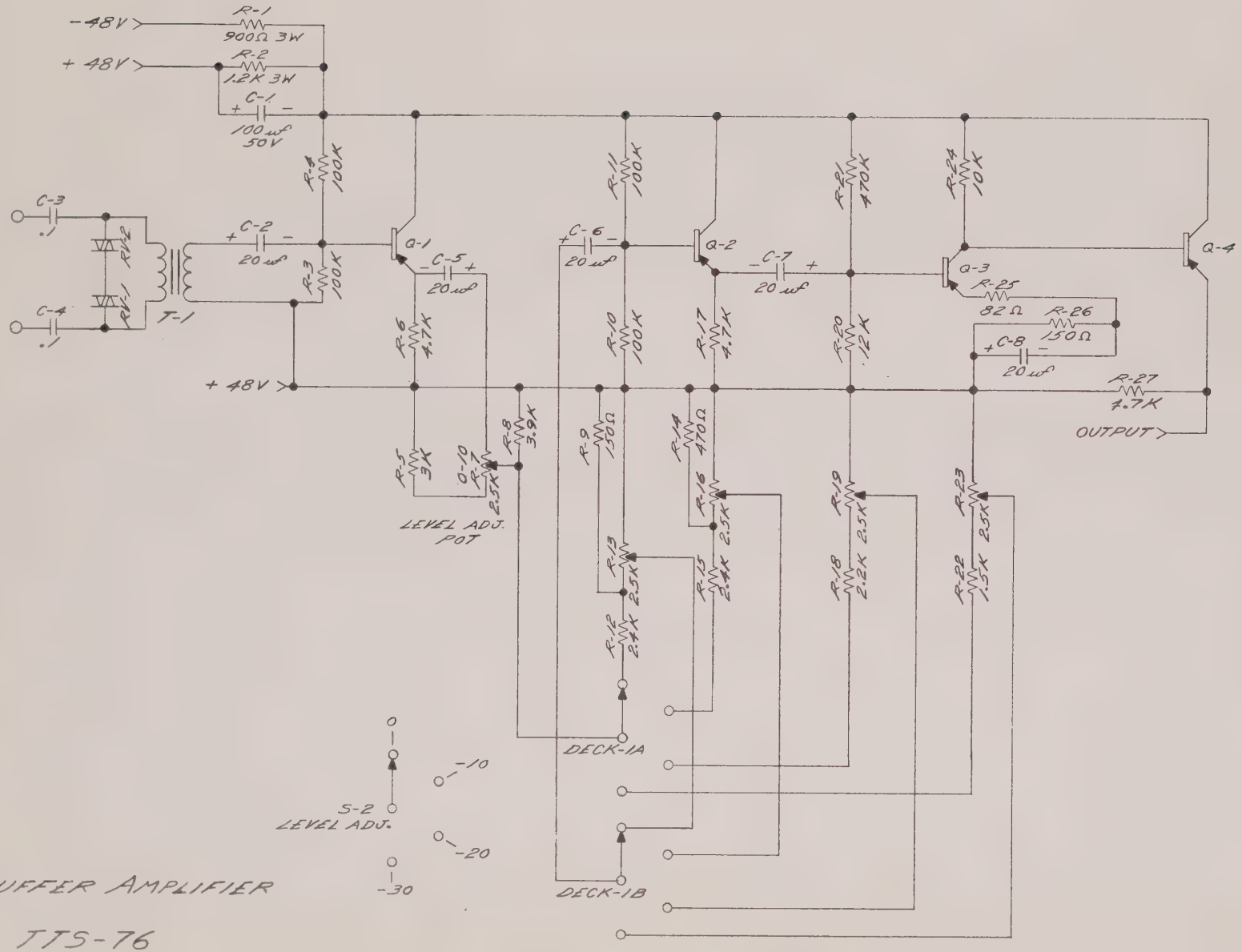
E95078
TTS-76
PEAK DETECTOR + AGC.



Monitor Amp.

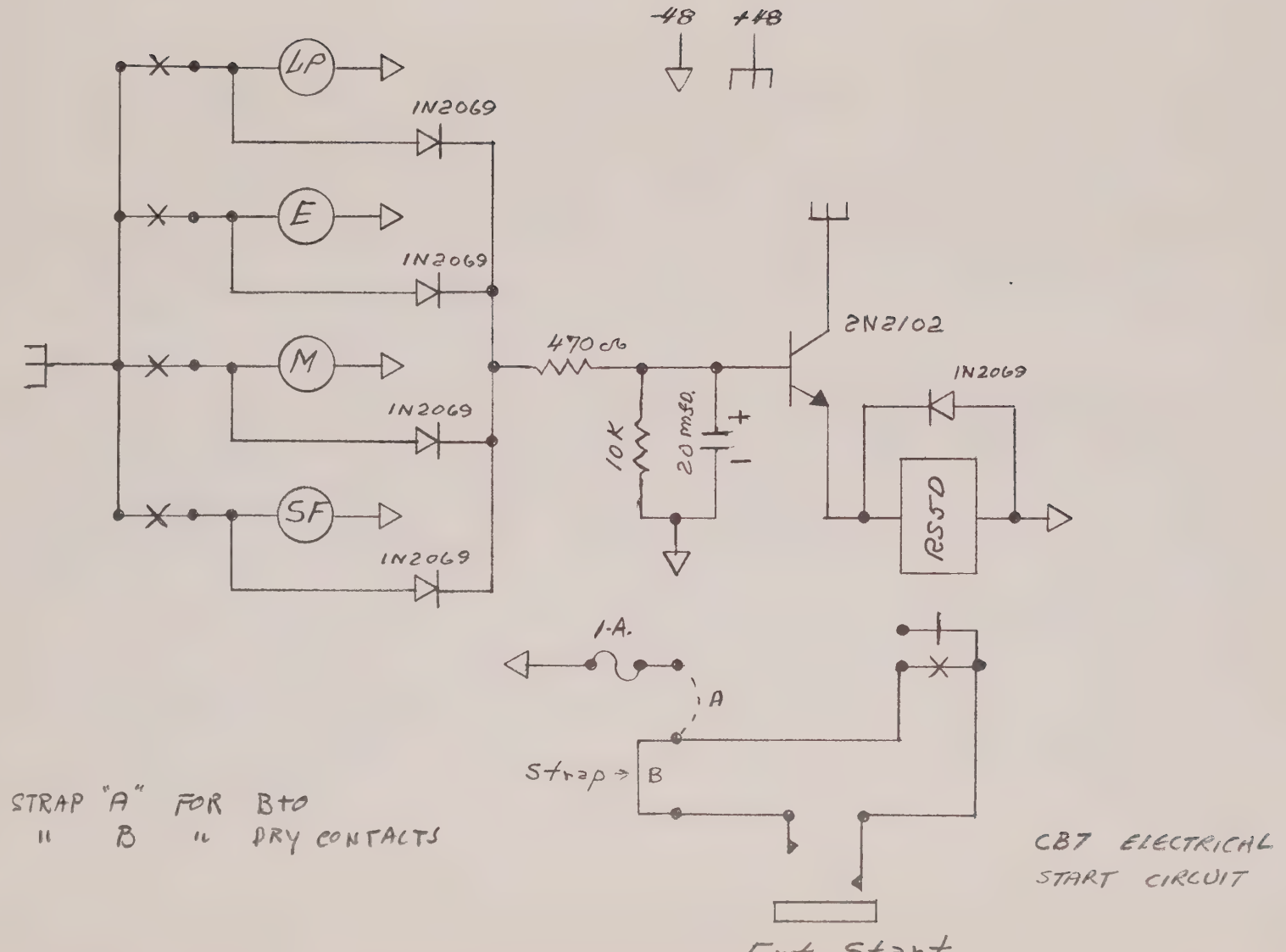
Q1 + Q2 2N1375

Q3 - Q4 + Q5 2N2102



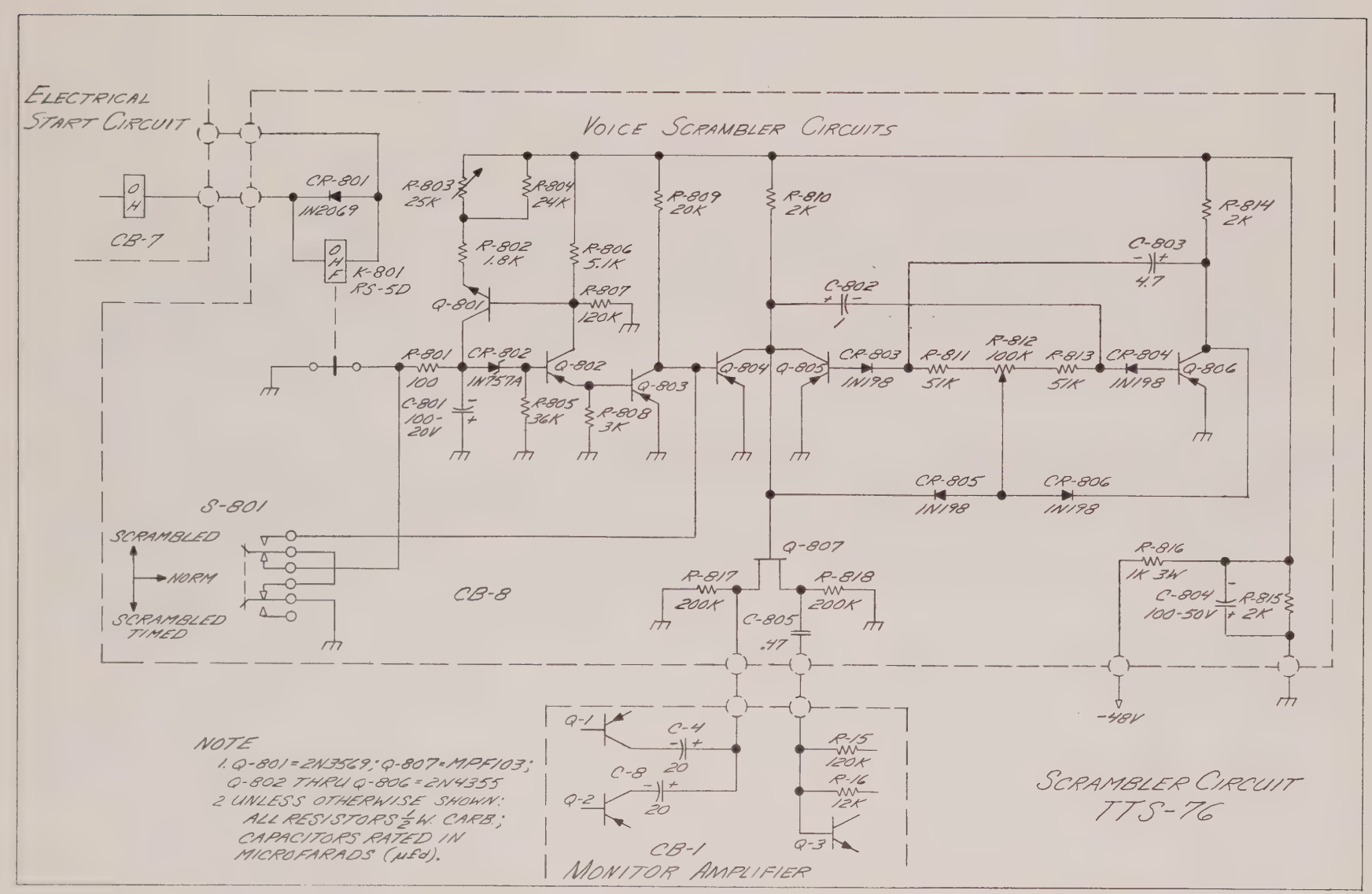
BUFFER AMPLIFIER

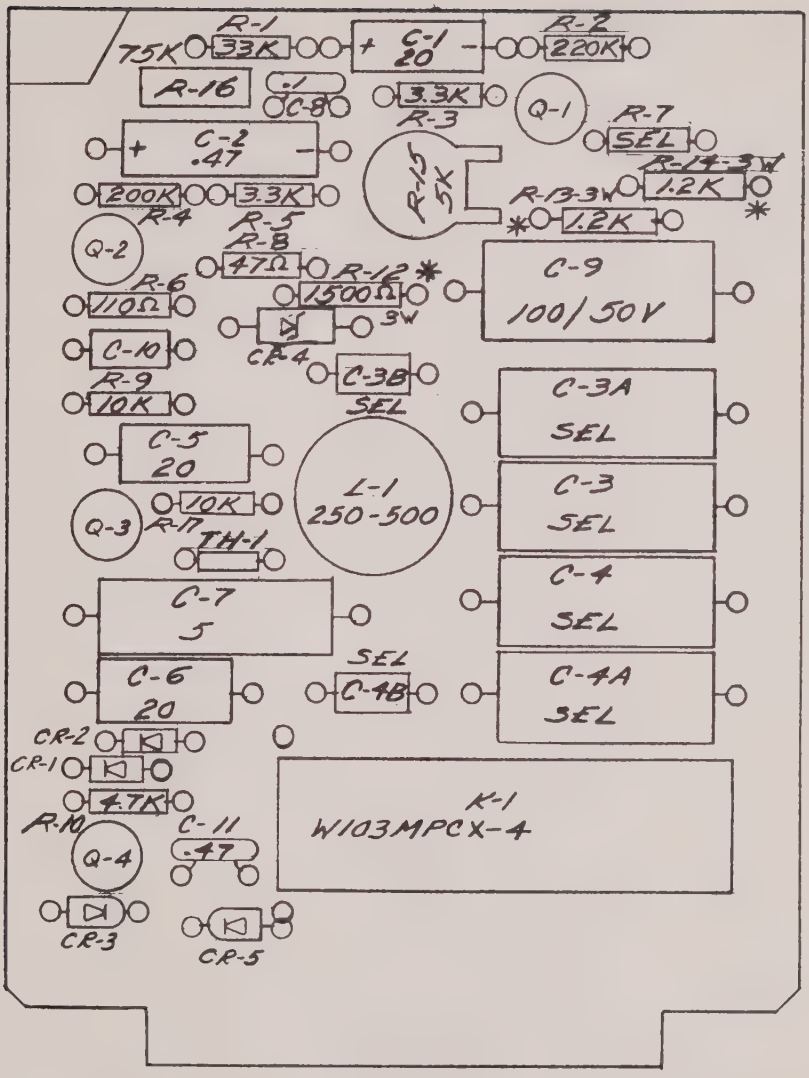
TTS-76



STRAP "A" FOR B+O
" B " DRY CONTACTS

CB7 ELECTRICAL
START CIRCUIT

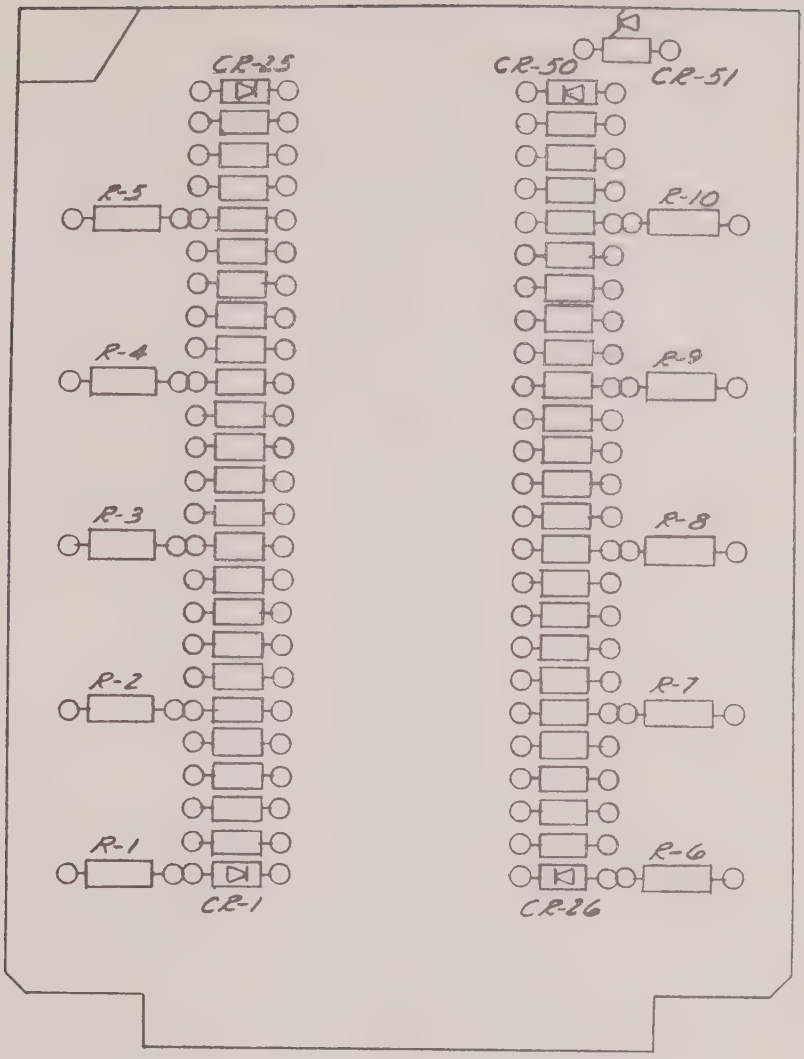

ELECTRICAL START CIRCUIT
VOICE SCRAMBLER CIRCUITS
CB-7
O H
CR-801 IN2069
K-801 RS-5D
R-803 25K
R-804 24K
R-809 20K
R-810 2K
R-814 2K
C-803 4.7
R-802 1.8K
R-806 5.1K
R-807 120K
Q-801
C-802
R-801 100
CR-802 IN757A
Q-802
Q-803
C-801 100-20V
R-805 36K
R-808 3K
Q-804
Q-805
CR-803 IN198
R-811 51K
R-812 100K
R-813 51K
CR-804 IN198
Q-806
CR-805 IN198
CR-806 IN198
S-801
SCRAMBLED
NORM
SCRAMBLED TIMED
CB-8
Q-807
R-817 200K
R-818 200K
C-805 .47
R-816 1K 3W
C-804 100-50V
R-815 2K
-48V
Q-1
C-4 20
C-8 20
Q-2
R-15 120K
R-16 12K
Q-3
CB-1
MONITOR AMPLIFIER
NOTE
1. Q-801 = 2N3569; Q-807 = MPF103; Q-802 THRU Q-806 = 2N4355
2 UNLESS OTHERWISE SHOWN: ALL RESISTORS ½ W. CARB.; CAPACITORS RATED IN MICROFARADS (μFd).
SCRAMBLER CIRCUIT TTS-76



NOTES:

ALL TRANS. = 2N1375
C-10 = 820 mmf
* 3 W RES.
CR-1, CR-2 = 1N198
CR-3, CR-5 = 1N2069
CR-4 = 1N3029

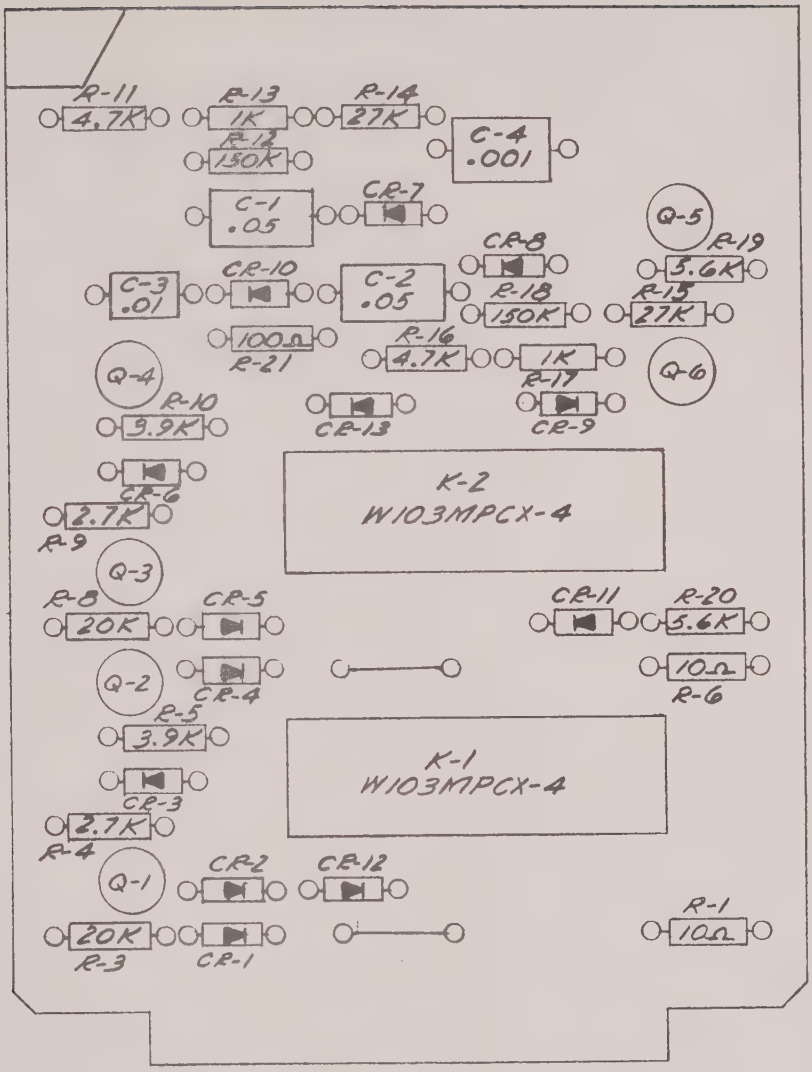
MODEL TTS-510-A
(P.C. BD. E-95093)
CARDS #1 THRU #13



NOTES:

CR-51 = IN748A
ALL RES. = 2.7K ½W
ALL DIODES = IN198

KEY PULSE TO DEC CONV
(P.C. BD. #E-95100)
(CARD 15)

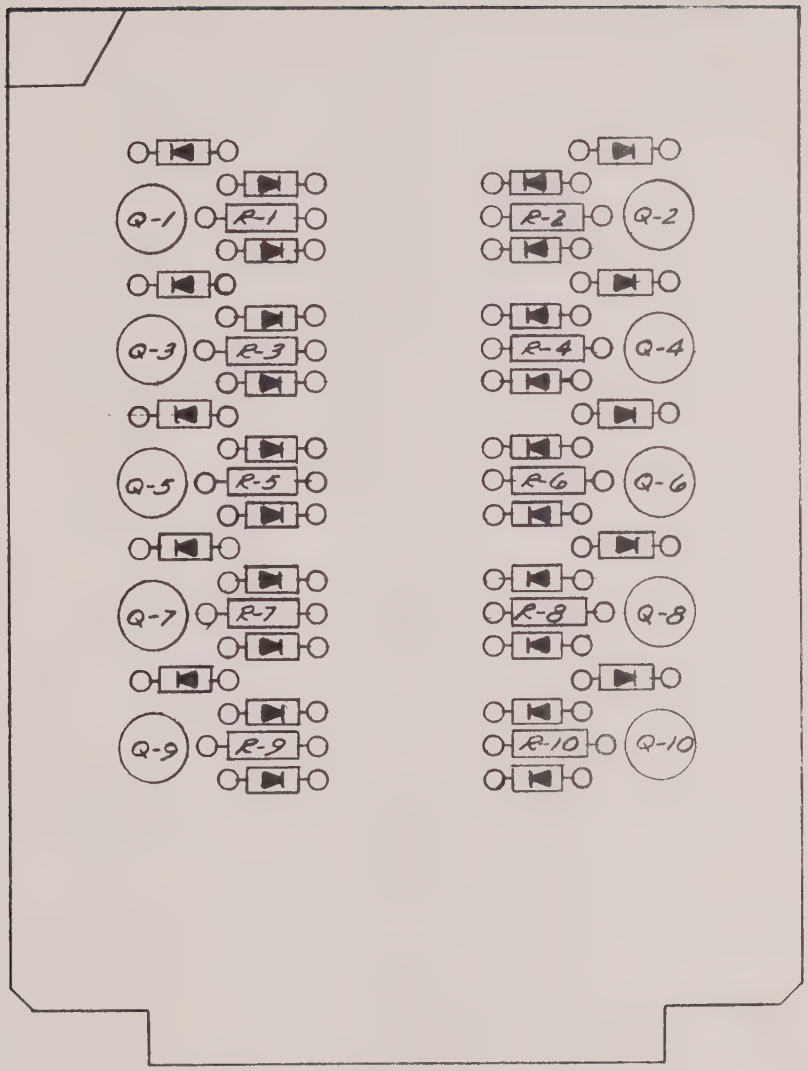


NOTES:

Q-1, Q-3 = 2N1375
Q-2, Q-4 = 2N1595
Q-5, Q-6 = 2N2102
CR-1 THRU CR-11 = 1N198
CR-12, CR-13 = 1N2069
ALL CAP. IN MICROFARADS
ALL RES. ½ W

ST-KP & GATE CKTS

(P. C. BD. E-95091)
(CARD 16)

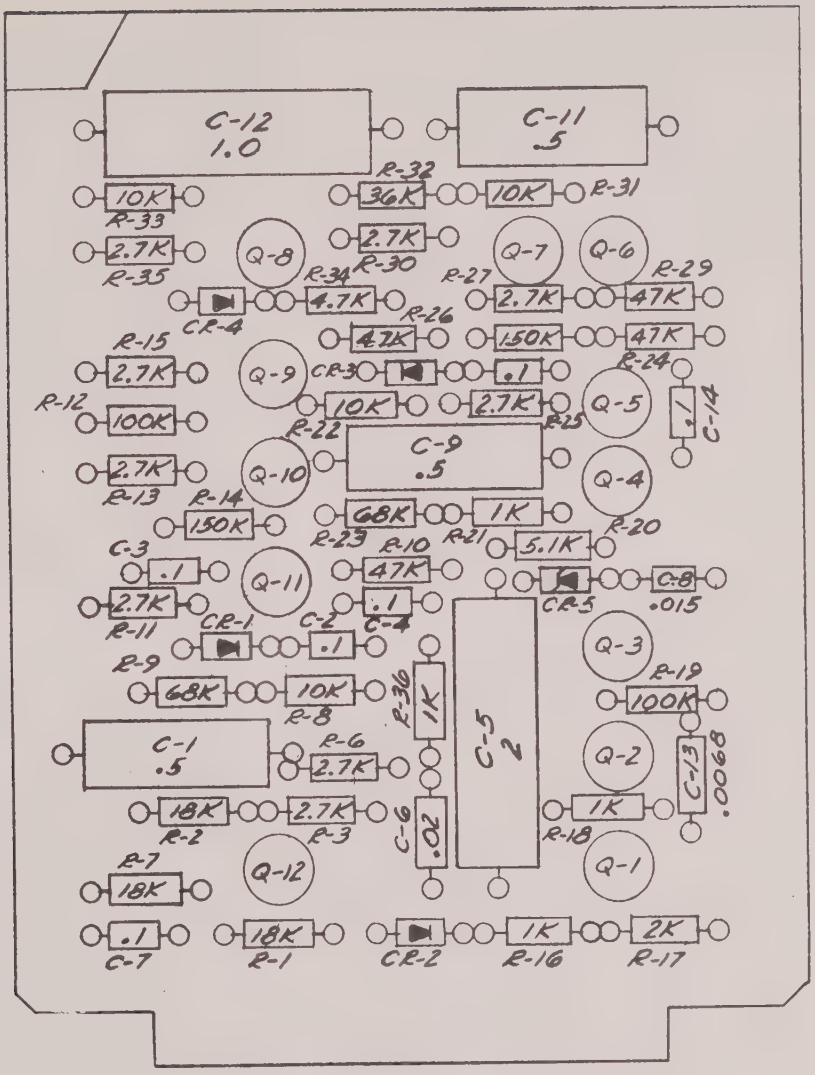


NOTES:

ALL TRANS. = SCR C6A
ALL RES. = 3.9K ½ W
ALL DIODES = IN198

10 BIT SCR STORAGE

(P. C. BD. #-95087)
(CARD 18 THRU 31)

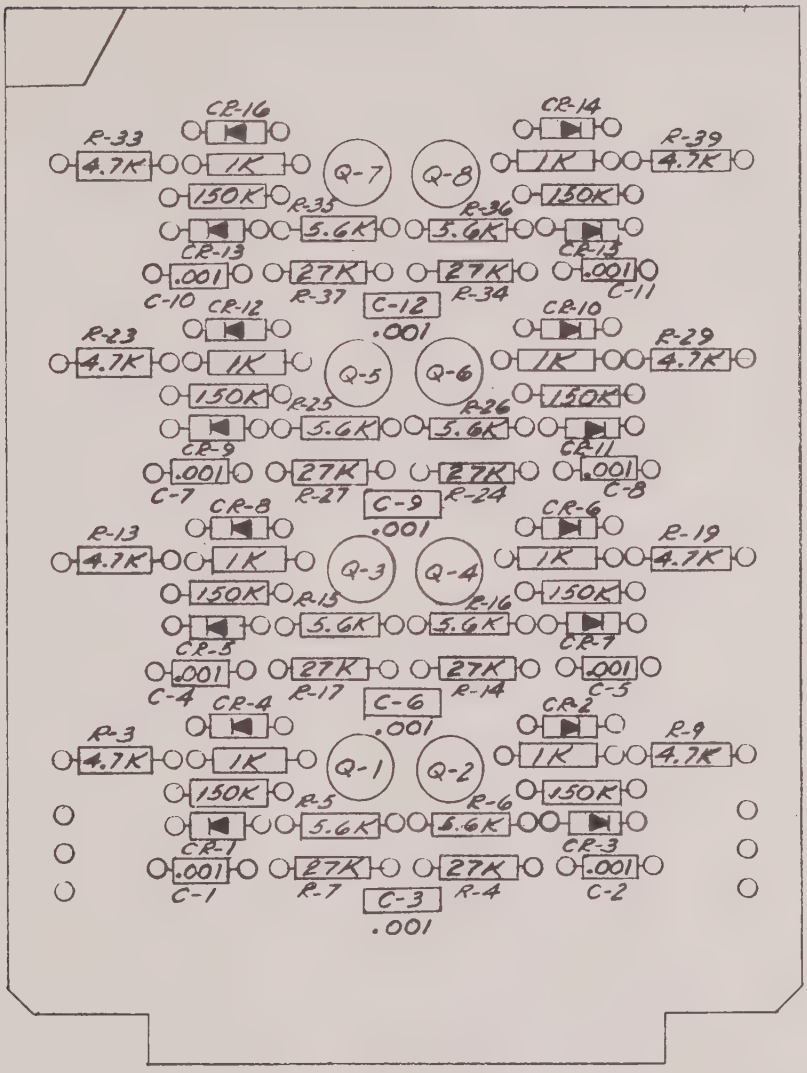


NOTES:

Q-2, Q-7, Q-8, Q-9 = 2N1375
ALL OTHER TRANS. = 2N2102
CR-5 = 5V-9
ALL OTHER DIODES = 1N198
ALL CAP. IN MICROFARADS
ALL RES. ½ W

SCAN PULSE GEN.

(P. C. BD. E-95082)
(CARD 32)

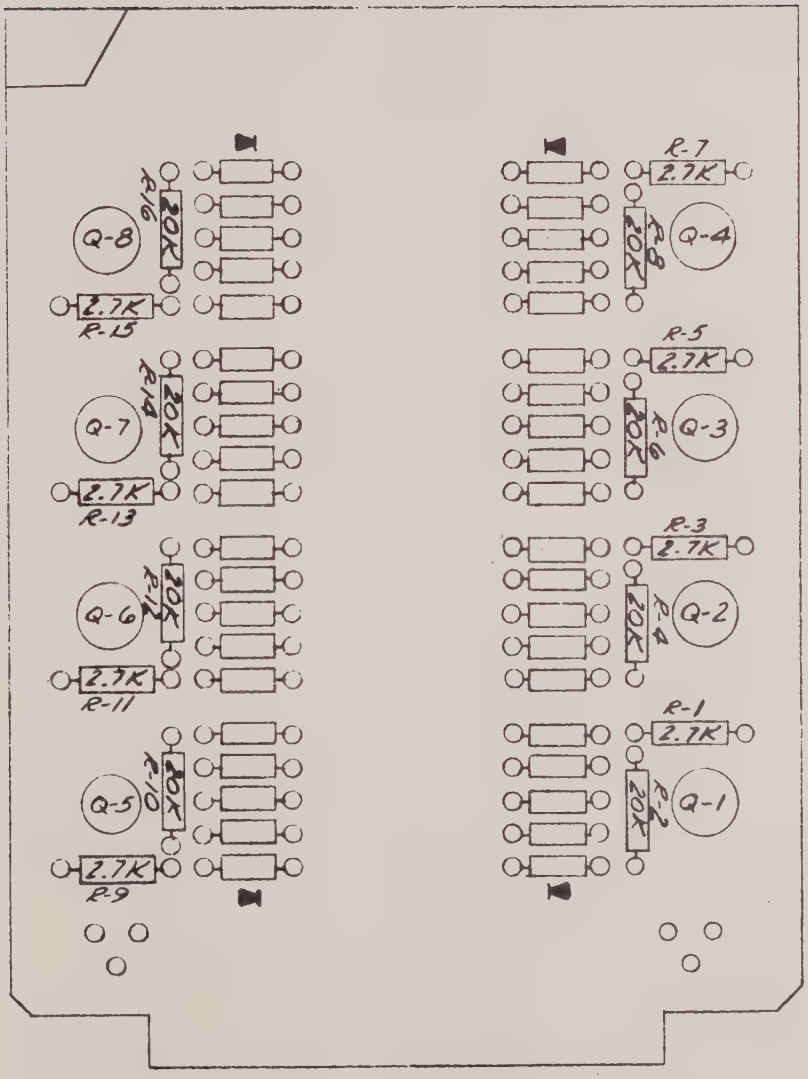


NOTES:

ALL DIODES = 1N198
ALL TRANS = 2N2102
ALL CAP. IN MICROFARADS
ALL RES. ½ W

QUAD FLIP FLOP

(P. C. BD. #-95083)
(CARD 33, 36)



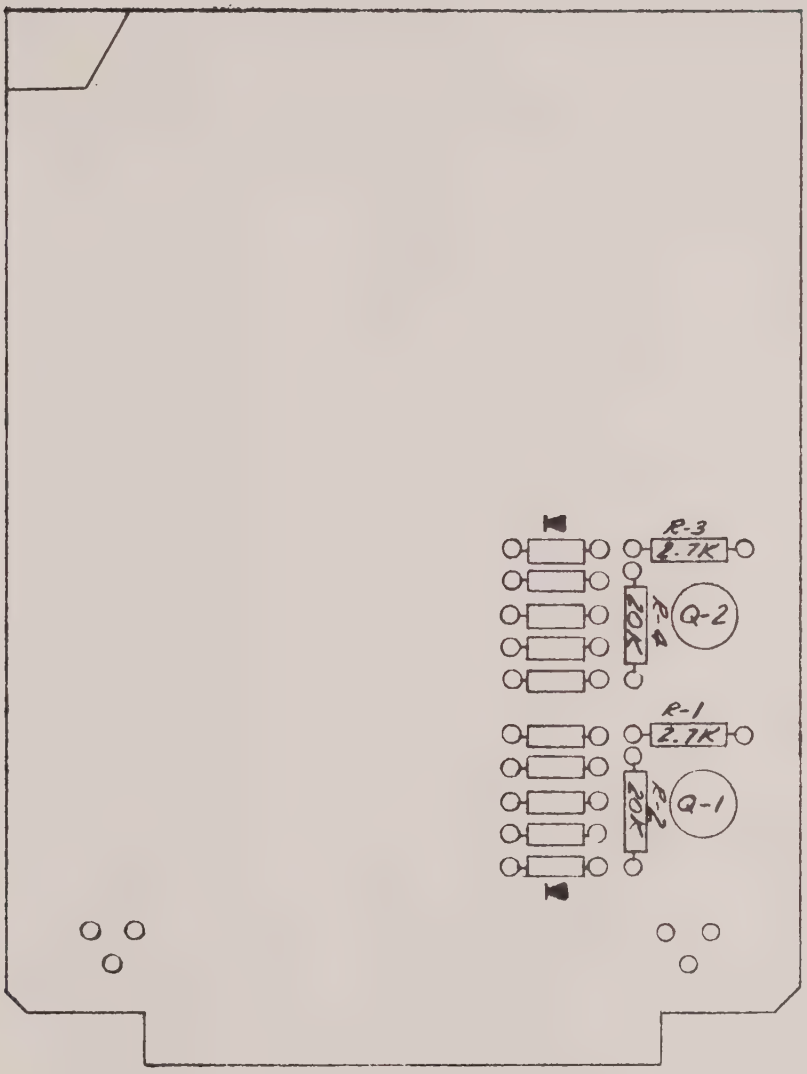
NOTES:

ALL TRANS. = 2N1375
ALL DIODES = 1N198
ALL RES. ½ W.

B/D CONVERTER

(P. C. BD. E-95080)

(CARD 34, 37)



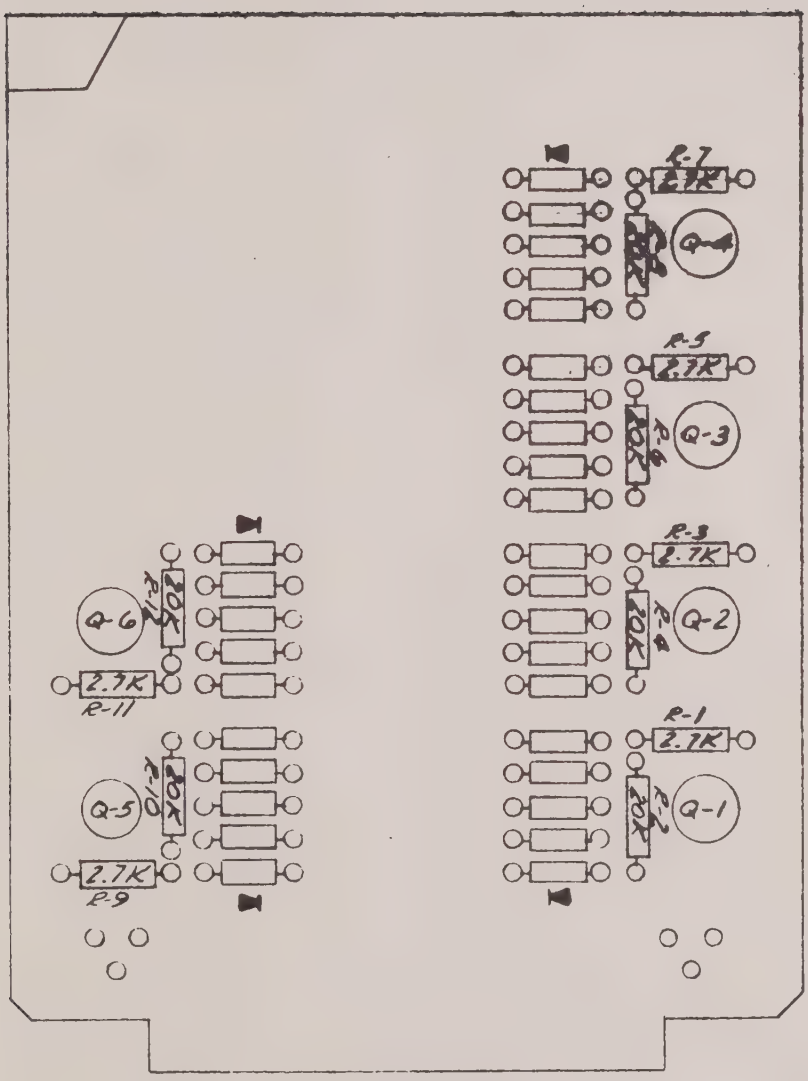
NOTES:

ALL TRANS. = 2N1375
ALL DIODES = 1N198
ALL RES. 1/2 W.

B/D CONVERTER

(P. C. BD. #-95080)

(CARD 35)



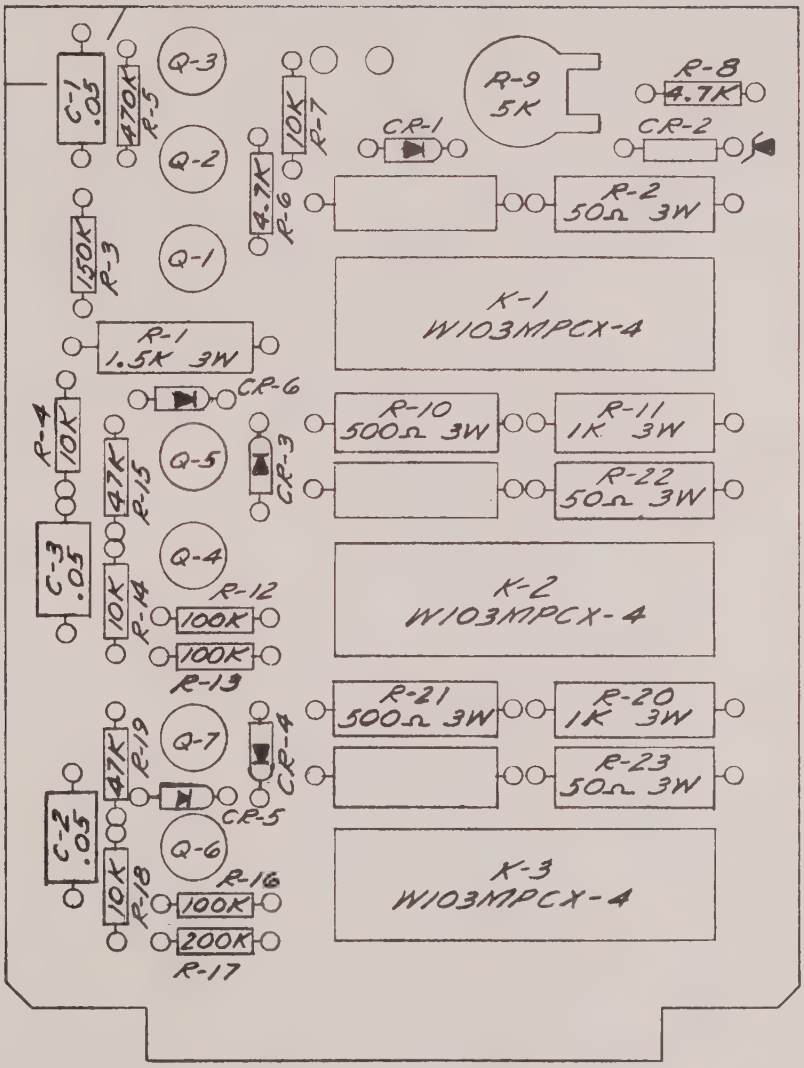
NOTES:

ALL TRANS. = 2N1375
ALL DIODES = 1N198
ALL RES. ½ W.

B/D CONVERTER

(P. C. BD. E-95080)

(CARD 36)



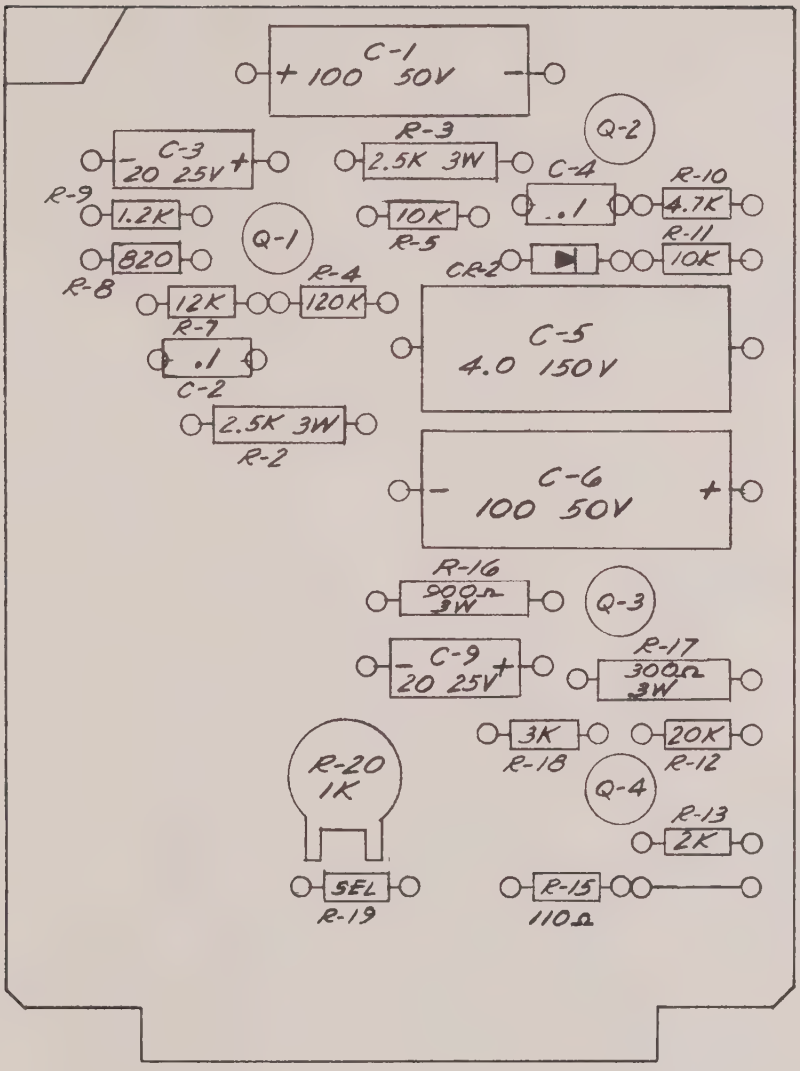
NOTES:

CR-2 = 1N3029B
ALL OTHER DIODES = 1N2069
ALL RES. ½ W UNLESS STATED
ALL CAP. IN MICROFARADS
Q-1, Q-2, Q-4, Q-5 = 2N1375
Q-3, Q-6, Q-7 = 2N2102

DC BRDG CKTS

(P. C. BD. E-95077)

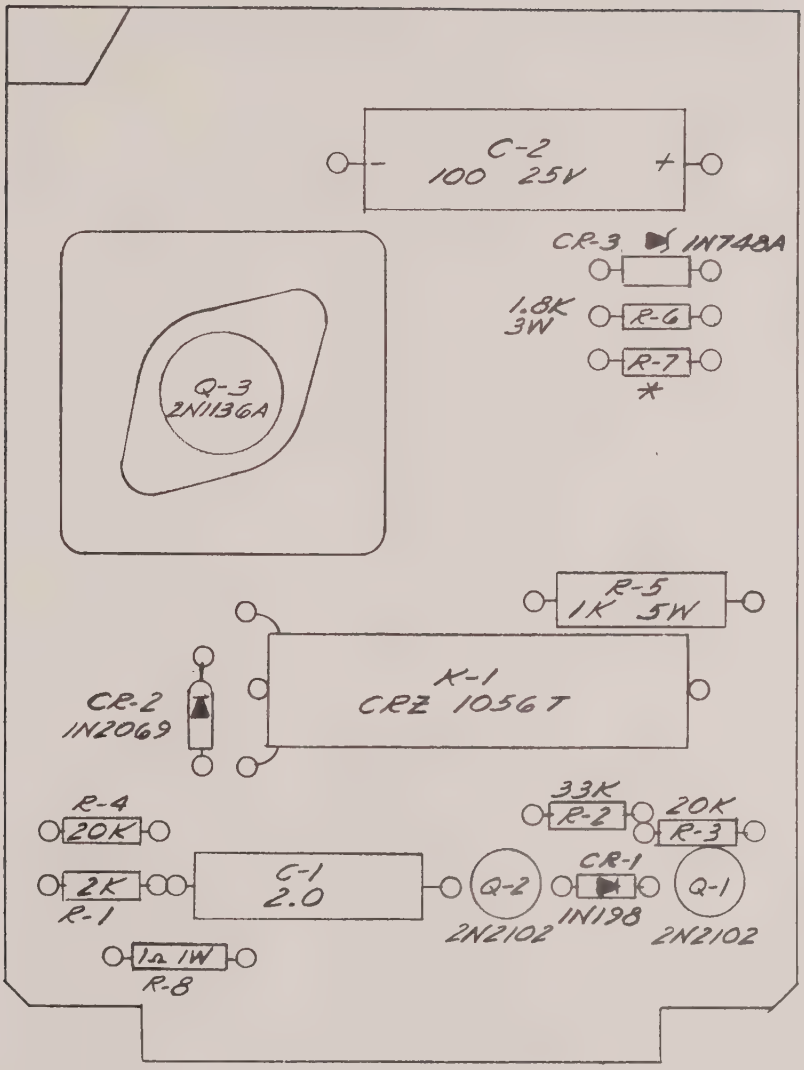
(CARD 39)



NOTES:

Q-1 , Q-2 = 2N1375
Q-3 = 2N2606
Q-4 = 2N3638
ALL CAP. IN MICROFARADS
ALL RES. ½W UNLESS STATED
CR-2 = 1N695

PEAK DET.
(P.C. BD. E-95078)
(CARD 40)



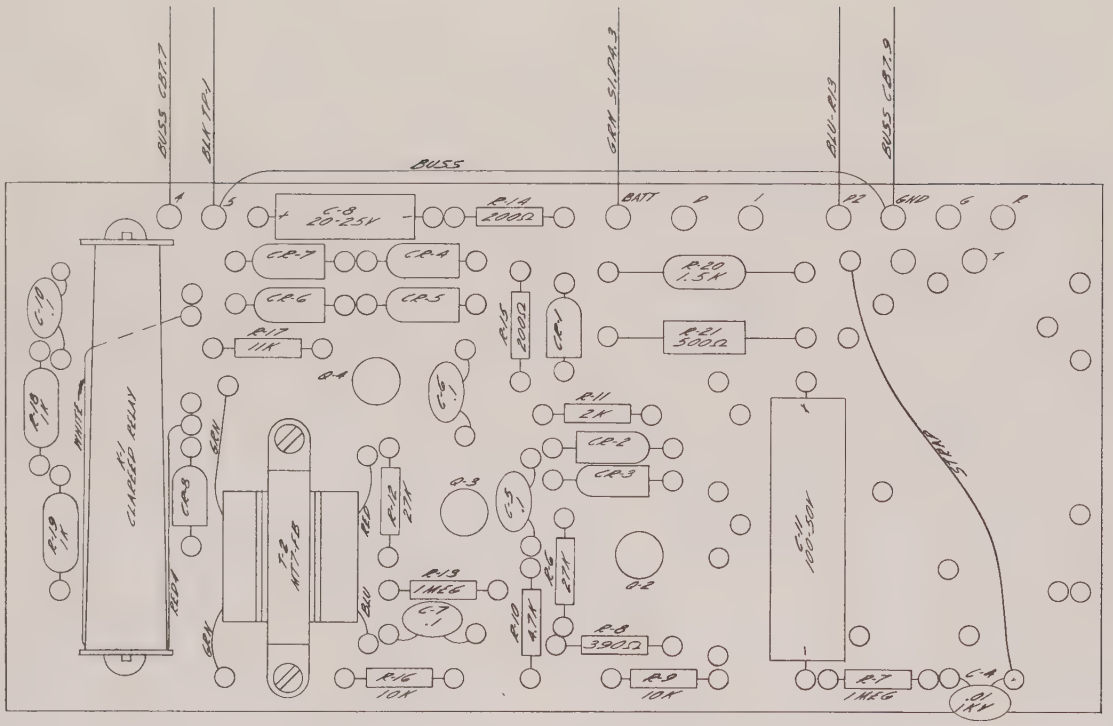
NOTES:

ALL RES ½ W UNLESS STATED
ALL CAP. IN MICROFARADS
* = SELECTED VALUE

SCR GATE & 4V BIAS

(P. C. BD. E-95106)

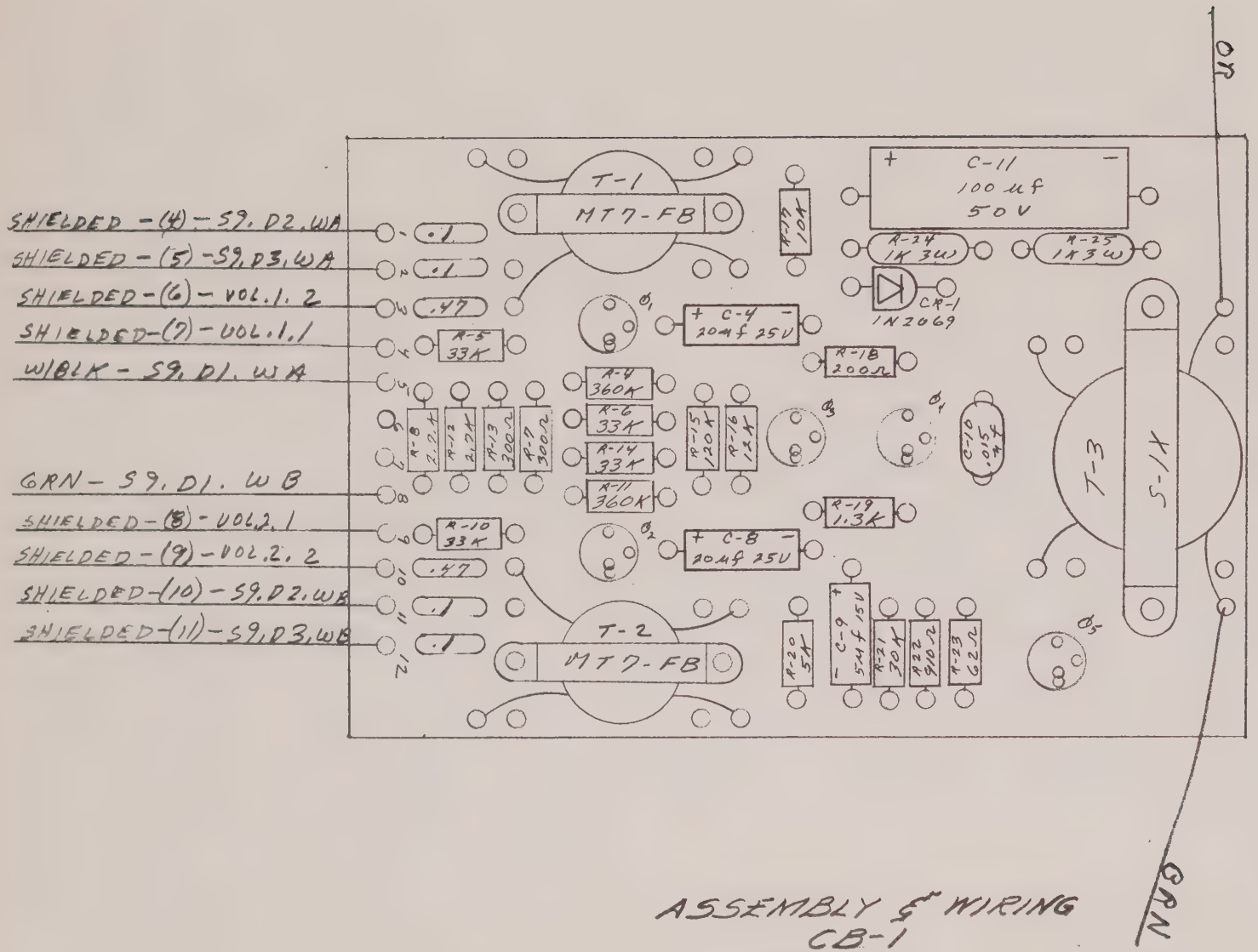
(CARD 41)



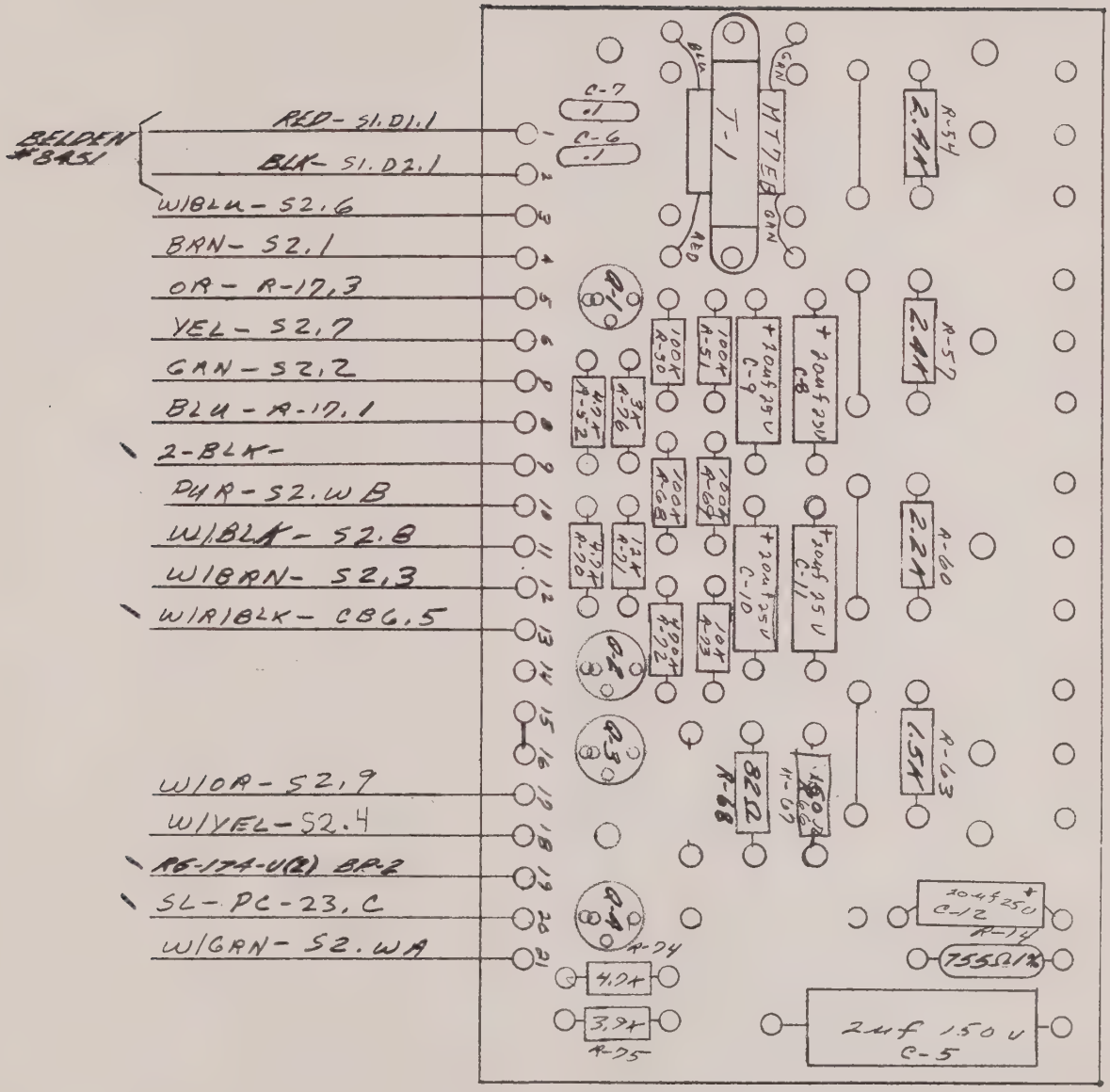
NOTES:
ALL DIODES 1N4006
ALL TRANSISTORS 2N1375
ALL .1 CAPS 75V

P.C. Bd. Ass'y.
Strapping & Wiring
E-95038

TTS-76

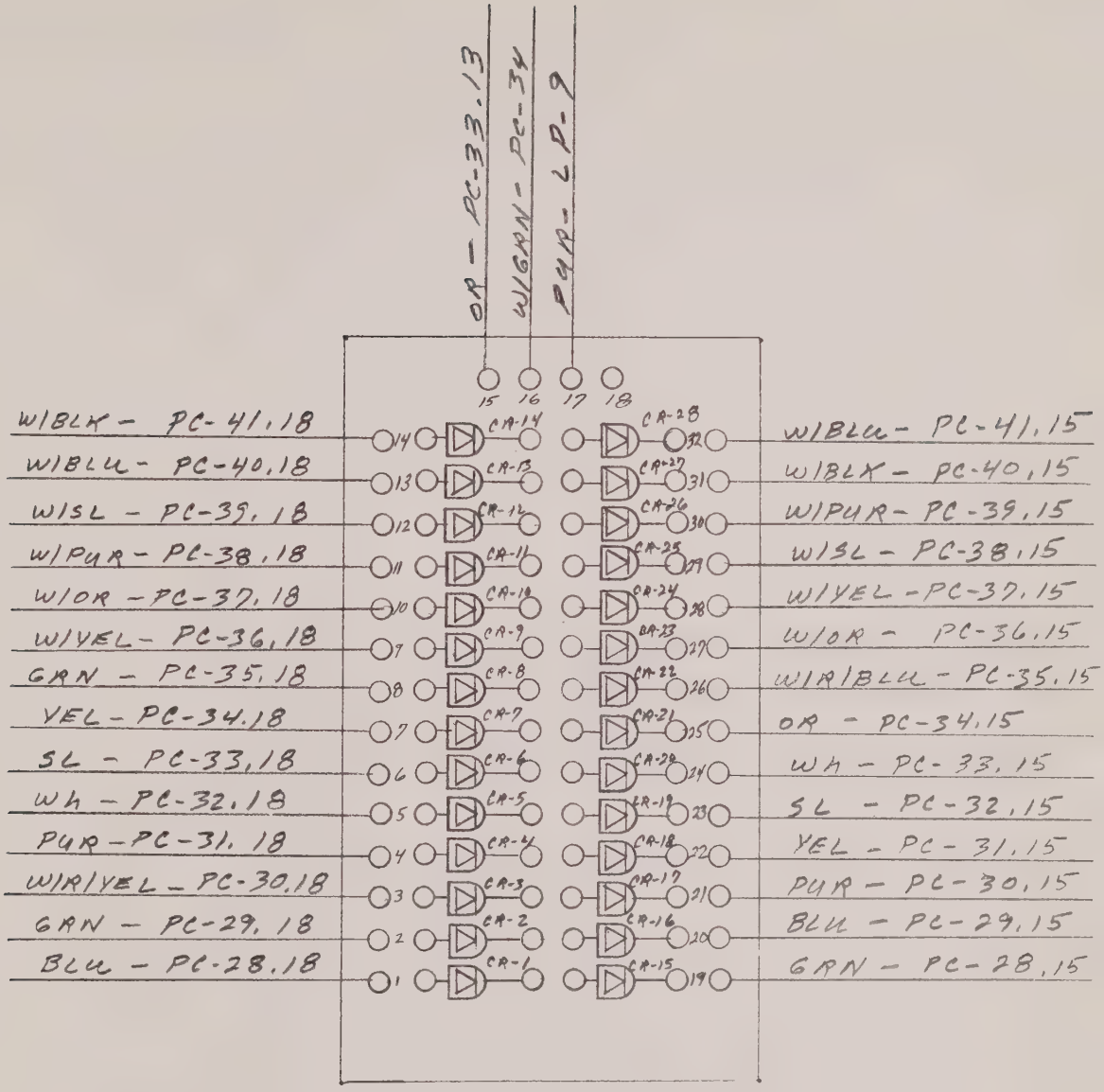


ASSEMBLY & WIRING
CB-1

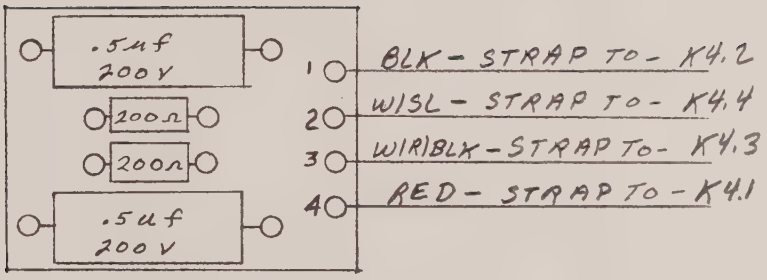


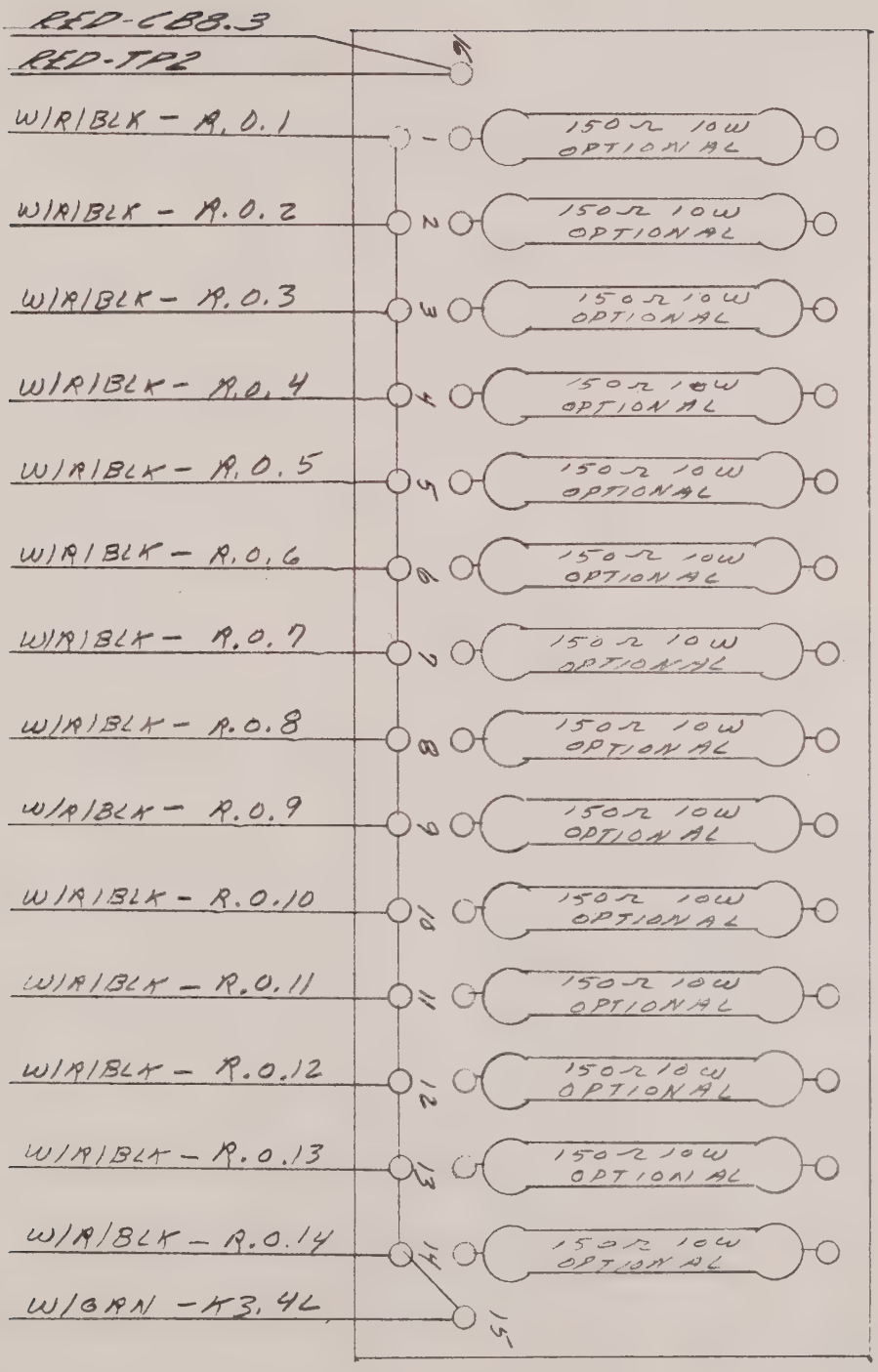
Q1-Q4 = 2N1375

ASSEMBLY & WIRING
CB-2



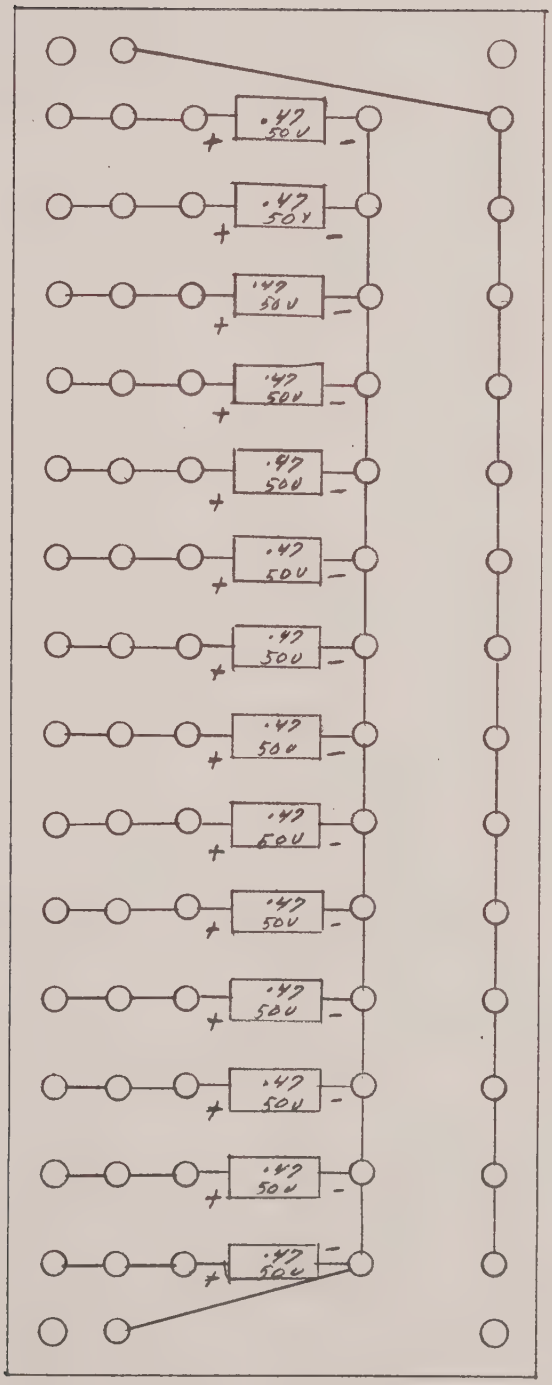
ASSEMBLY & WIRING
CB-3


.5uf
200V
200Ω
200Ω
.5uf
200V
1
2
3
4
BLK - STRAP TO - K4.2
WISL - STRAP TO - K4.4
WIRIBLK - STRAP TO - K4.3
RED - STRAP TO - K4.1



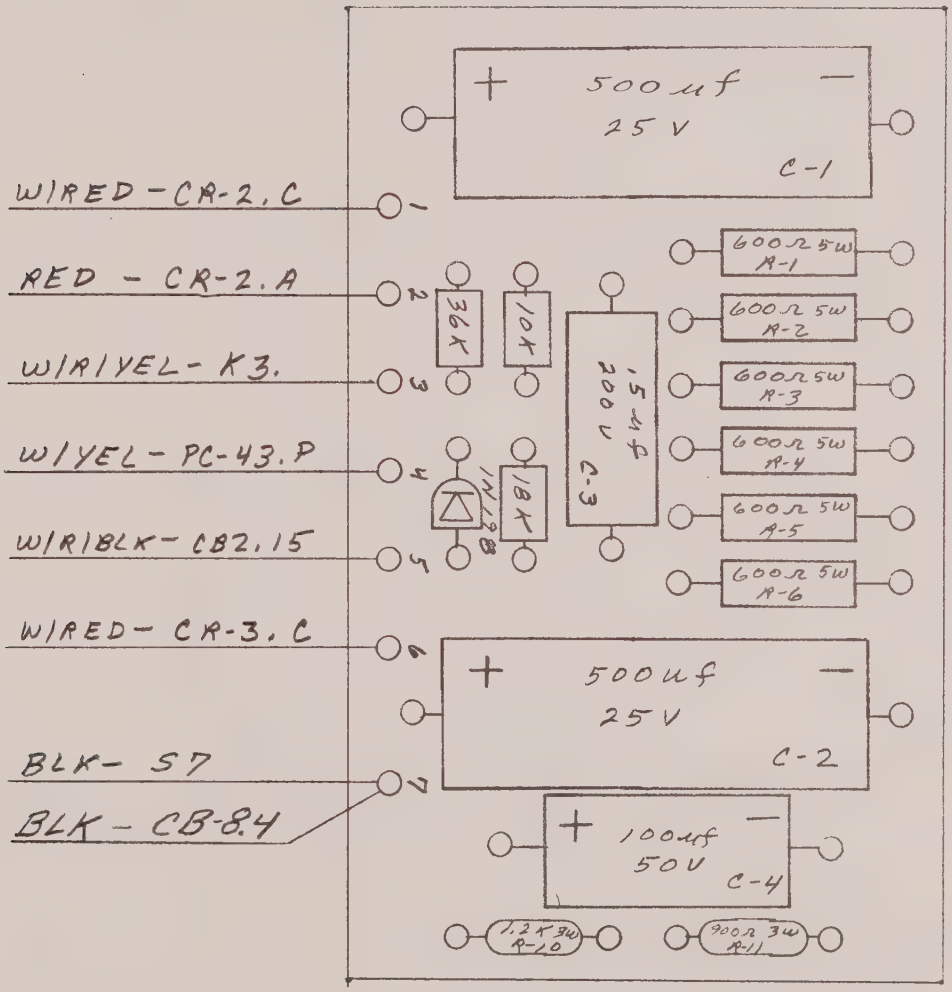
NOTE: FOR 48V LAMPS DELETE RESISTOR AND ADD STRAPPING FOR 24V LAMPS, DELETE STRAPPING AND ADD RESISTORS

ASSEMBLY & WIRING
CB-5 FRONT



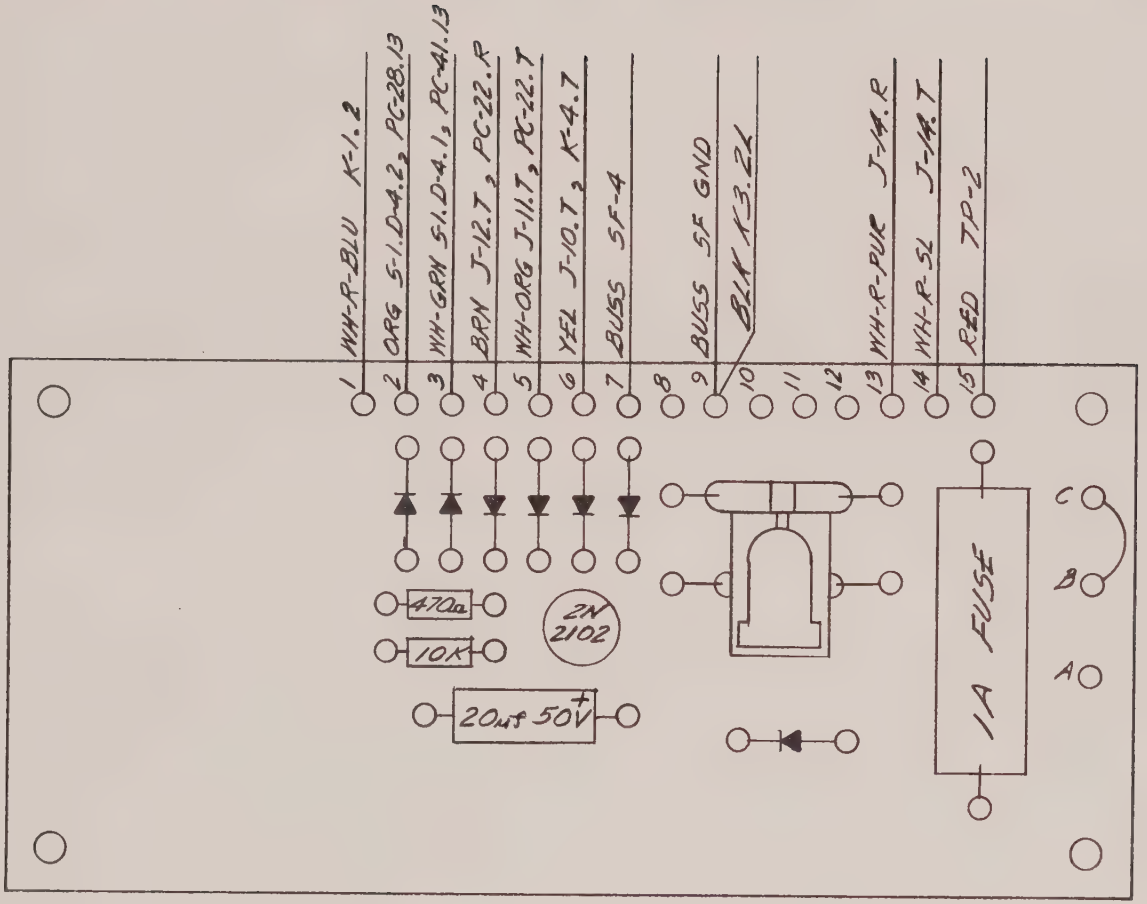
ASSEMBLY & WIRING CB5 REAR

TIS-76 COMPONENT DETAIL REAR



FRONT

ASSEMBLY & WIRING
CB-6



ASSEMBLY & WIRING
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TTS-76

SECTION 5

ELECTRONIC PARTS LIST

5.1 INTRODUCTION. The following pages contain the parts list for the Model TTS 76.

5.2 FSCM Code Numbers. The Federal Supply Code of Manufacturers of each part. A list of codes and their respective manufacturers is given below.

LIST OF MANUFACTURERS

Code No.	Manufacturer	Code No.	Manufacturer
00348	Microtran	44655	Ohmite
00656	Aerovox	49671	RCA
01121	Allen Bradley	70903	Belden
01295	Texas Instruments	71400	Bussman
04009	Arrow-Hart & Hegeman	71482	C.P. Clare
04618	American Pamcor	71590	Centralab
04773	Automatic Electric	72619	Dialco
05820	Wakefield	74199	Quam
06555	Beede	74545	Harvey Hubbell
07716	IRC	75376	Kurz-Kasch
09653	IEI	75915	Littelfuse
12065	Transitron	77342	Potter & Brumfield
12143	Bendix	80368	Sylvania
12697	Clarostat	81071	Schauer
12954	Dickson	81095	Triad
13606	Sprague	82389	Switchcraft
15873	Motorola	82877	Rotron
17803	Fairchild	83186	Victory
17856	Siliconix	90201	Mallory
18043	Profile	91662	Elco
24138	International Electronics	94696	Magnecraft
24446	General Electric		

PC Bd. E95038

S.F. Detector Card

Ref Desig.	Description	Manufacturer (FSCM Code #)	Part Number
R1	R: fxd ww 500Ω 5% 3W	44655	4411
R2	R: fxd ww 1.5K 5% 3W	44655	4427
R3	R: fxd comp 1MΩ $\frac{1}{2}$W 10%	01121	
R4	R: fxd comp 27K $\frac{1}{2}$W 10%	01121	
R5	R: fxd comp 10K $\frac{1}{2}$W 10%	01121	
R6	R: fxd comp 390Ω $\frac{1}{2}$W 5%	01121	
R7	R: fxd comp 4.7K $\frac{1}{2}$W 10%	01121	
R8	R: fxd comp 1 MΩ $\frac{1}{2}$W 10%	01121	
R9	R: fxd comp 27K $\frac{1}{2}$W 10%	01121	
R10	R: fxd comp 10K $\frac{1}{2}$W 10%	01121	
R11	R: fxd comp 200Ω $\frac{1}{2}$W 5%	01121	
R12	R: fxd comp 200Ω $\frac{1}{2}$W 5%	01121	
R13	R: fxd comp 11K $\frac{1}{2}$W 5%	01121	
R14	R: fxd ww 1K 3W 5%	44655	4423
R15	R: fxd ww 1K 3W 5%	44655	4423
CR1	Diode: silicon	80368	1N2069
CR2	Diode: silicon	80368	1N2069
CR3	Diode: silicon	80368	1N2069
CR4	Diode: silicon	80368	1N2069
CR5	Diode: silicon	80368	1N2069
CR6	Diode: silicon	80368	1N2069
CR7	Diode: silicon	80368	1N2069
CR8	Diode: silicon	80368	1N2069
C1	C: fxd ppr 0.01μF 75V	12697	IDO-1
C2	C: fxd elect 100μF 50V	09653	APD-127
C3	C: fxd ppr 0.1μF 75V	12697	DDA-104
C4	C: fxd ppr 0.1μF 75V	12697	DDA-104
C5	C: fxd ppr 0.1μF 75V	12697	DDA-104
C6	C: fxd elect 20μF 25V	09653	APD-046
C7	C: fxd ppr 5μF 50V	13606	TVA-1303
T1	Transformer:	00348	MT7-FB
K1	Relay	71482	CRZ-1056
Q1	Transistor	01295	SN1375
Q2	Transistor	01295	SN1375
Q3	Transistor	01295	SN1375

PC Bd. E95077 - D.C. Bridging Circuits

Ref Desig.	Description	Manufacturer (FSCM Code #)	Part Number
R1	R: fxd ww 1.5K 3W 5%	44655	4427
R2	R: fxd ww 20Ω 3W 5%	44655	4380
R3	R: fxd comp 150K ½W 5%	01121	
R4	R: fxd comp 10K ½W 10%	01121	
R5	R: fxd comp 470K ½W 10%	01121	
R6	R: fxd comp 4.7K 10% ½W	01121	
R7	R: fxd comp 10K ½W 10%	01121	
R8	R: fxd comp 4.7K ½W 10%	01121	
R9	R: var comp 5K ½W 10%	90201	MTC-4
R10	R: fxd ww 500Ω 3W 5%	44655	4411
R11	R: fxd ww 1K 3W 5%	44655	4423
R12 and R13	R: fxd comp 100K ½W 10%	01121	
R14	R: fxd comp 10K ½W 10%	01121	
R15	R: fxd comp 47K ½W 10%	01121	
R16	R: fxd comp 100K ½W 10%	01121	
R17	R: fxd comp 200K ½W 5%	01121	
R18	R: fxd comp 10K ½W 10%	01121	
R19	R: fxd comp 47K ½W 10%	01121	
R20	R: fxd ww 1K 3W 5%	44655	4423
R21	R: fxd ww 500Ω 3W 5%	44655	4411
R22 and R23	R: fxd ww 50Ω 3W 5%	44655	
C1 thru C3	C: fxd ppr 0.05μF 200V	13606	2PS-550
CR1	Diode: silicon	80368	1N2069
CR2	Diode: zener	15873	1N3029B
CR3 thru CR6	Diode: silicon	80368	1N2069
Q1 and Q2	Transistor: PNP	01295	SN1375
Q3	Transistor: NPN	49671	2N2102
Q4 and Q5	Transistor: PNP	01295	SN1375
Q6 and Q7	Transistor: NPN	49671	2N2102
K1 thru K3	Relay: SPDT Reed	94696	W103MPCX-4

PC Bd. E95078 - Peak Detector

Ref Desig.	Description	Manufacturer (FSCM Code #)	Part Number
R1	R: not used		
R2 and R3	R: fxd ww 2.5K 3W 5%	13606	242E2525
R4	R: fxd comp 120K $\frac{1}{2}$W 10%	01121	
R5	R: fxd comp 10K $\frac{1}{2}$W 10%	01121	
R7	R: fxd comp 12K $\frac{1}{2}$W 10%	01121	
R8	R: fxd comp 820Ω $\frac{1}{2}$W 10%	01121	
R9	R: fxd comp 1.2K $\frac{1}{2}$W 10%	01121	
R10	R: fxd comp 4.7K $\frac{1}{2}$W 5%	01121	
R11	R: fxd comp 10K $\frac{1}{2}$W 10%	01121	
R12	R: fxd comp 20K $\frac{1}{2}$W 10%	01121	
R13	R: fxd comp 2K $\frac{1}{2}$W 5%	01121	
R14	R: not used		
R15	R: sel val		
R16	R: fxd ww 900Ω 3W 5%	13606	242E9015
R17	R: fxd ww 300Ω 3W 5%	13606	242E3015
R18	R: fxd comp 3K $\frac{1}{2}$W 5%	01121	
R19	R: sel val		
R20	R: var comp 1K	90201	
C1	C: fxd elect 100μF 50V	13606	TVA-1310
C2	C: fxd ppr 0.1μF 75V	71590	DDA-104
C3	C: fxd elect 20μF 50V	13606	TE-1305
C4	C: fxd ppr 0.1μF 75V	71590	DDA-104
C5	C: fxd ppr 4.0μF 150V	13606	121P4
C6	C: fxd elect 100μF 50V	13606	TVA-1310
C7 and C8	C: not used		
C9	C: fxd elect 20μF 50V	13606	TE-1305
CR1	not used		
CR2	Diode	12065	1N695
Q1 and Q2	Transistor: PNP	01295	SN1375
Q3	Transistor: Field Effect	17856	2N2606
Q4	Transistor: PNP	17803	2N3638

PC Bd. E95080 - B/D Converter Card

Ref Desig.	Description	Manufacturer (FSCM Code #)	Part Number
R1	R: fxd comp 2.7K $\frac{1}{2}$W 5%	01121	
R2	R: fxd comp 20K $\frac{1}{2}$W 10%	01121	
R3	R: fxd comp 2.7K $\frac{1}{2}$W 5%	01121	
R4	R: fxd comp 20K $\frac{1}{2}$W 10%	01121	
R5	R: fxd comp 2.7K $\frac{1}{2}$W 5%	01121	
R6	R: fxd comp 20K $\frac{1}{2}$W 10%	01121	
R7	R: fxd comp 2.7K $\frac{1}{2}$W 5%	01121	
R8	R: fxd comp 20K $\frac{1}{2}$W 10%	01121	
R9	R: fxd comp 2.7K $\frac{1}{2}$W 5%	01121	
R10	R: fxd comp 20K $\frac{1}{2}$W 10%	01121	
R11	R: fxd comp 2.7K $\frac{1}{2}$W 5%	01121	
R12	R: fxd comp 20K $\frac{1}{2}$W 10%	01121	
R13	R: fxd comp 2.7K $\frac{1}{2}$W 5%	01121	
R14	R: fxd comp 20K $\frac{1}{2}$W 10%	01121	
R15	R: fxd comp 2.7K $\frac{1}{2}$W 5%	01121	
R16	R: fxd comp 20K $\frac{1}{2}$W 10%	01121	
Q1 thru Q8	Transistors:	01295	SN1375
CR1 thru CR40	Diodes	80368	1N198

PC Bd. E95082 - Scan Pulse Generator

Ref Desig.	Description	Manufacturer (FSCM Code #)	Part Number
R1	R: fxd comp 18K ½W 5%	01121	
R2	R: fxd comp 51K ½W 5%	01121	
R3	R: fxd comp 2.7K ½W 5%	01121	
R4 and R5	not used		
R6	R: fxd comp 2.7K ½W 5%	01121	
R7	R: fxd comp 18K ½W 5%	01121	
R8	R: fxd comp 10K ½W 10%	01121	
R9	R: fxd comp 68K ½W 5%	01121	
R10	R: fxd comp 47K ½W 10%	01121	
R11	R: fxd comp 2.7K ½W 5%	01121	
R12	R: fxd comp 100K ½W 10%	01121	
R13	R: fxd comp 2.7K ½W 5%	01121	
R14	R: fxd comp 150K ½W 5%	01121	
R15	R: fxd comp 2.7K ½W 5%	01121	
R16	R: fxd comp 1K ½W 10%	01121	
R17	R: fxd comp 2K ½W 5%	01121	
R18	R: fxd comp 1K ½W 10%	01121	
R19	R: fxd comp 100K ½W 10%	01121	
R20	R: fxd comp 5.1K ½W 5%	01121	
R21	R: 1K ½W	01121	
R22	R: fxd comp 10K ½W 10%	01121	
R23	R: fxd comp 68K ½W 5%	01121	
R24	R: fxd comp 47K ½W 10%	01121	
R25	R: fxd comp 2.7K ½W 5%	01121	
R26	R: fxd comp 47K ½W 10%	01121	
R27	R: fxd comp 2.7K ½W 5%	01121	
R28	R: not used		
R29	R: fxd comp 47K ½W 10%	01121	
R30	R: fxd comp 2.7K ½W 5%	01121	
R31	R: fxd comp 10K ½W 10%	01121	
R32	R: fxd comp 36K ½W 5%	01121	
R33	R: fxd comp 10K ½W 10%	01121	
R34	R: fxd comp 4.7K ½W 5%	01121	
R35	R: fxd comp 2.7K ½W 5%	01121	
R36	R: fxd comp 1K ½W 10%	01121	
C1	C: fxd ppr 0.2μF 75V	13606	225P
C2 thru C4	C: fxd ppr 0.1μF 75V	71590	DDA-104
C5	C: fxd ppr 2.0μF 150V	13606	121PZ
C6	C: fxd ppr 0.02μF 100V	13606	4PS-S20
C7	C: fxd ppr 0.1μF 75V	71590	DDA-104
C8	C: fxd ppr 0.015μF 100V	13606	4PS-S15

PC Bd. E95082 (cont.)

Ref Desig.	Description	Manufacturer (FSCM Code #)	Part Number
C9	C: fxd ppr 0.5μF 200V	00656	P-8292ZN12
C10	C: fxd ppr 0.1μF 75V	71590	DDA-104
C11	C: fxd ppr 0.5μF 200V	00656	P-8292ZN12
C12	C: fxd ppr 1.0μF 150V	13606	155P
C13	C: fxd ppr 0.0068μF 100V	13606	6PS-D68
C14	C: fxd ppr 0.1μF 75V	71590	DDA-104
CR1 thru CR4	Diodes	80368	1N198
CR5	Diode: zener	17803	SV9
Q1	Transistor: NPN	49671	2N2102
Q2	Transistor: PNP	01295	SN1375
Q3 thru Q6	Transistor: NPN	49671	2N2102
Q7 thru Q9	Transistor: PNP	01295	SN1375
Q10 thru Q12	Transistor: NPN	49671	2N2102

PC Bd. E95083 - Quad Flip/Flop

Ref Desig.	Description	Manufacturer (FSCM Code #)	Part Number
R1	R: fxd comp 150K ½W 5%	01121	
R2	R: fxd comp 1K ½W 10%	01121	
R3	R: fxd comp 4.7K ½W 5%	01121	
R4	R: fxd comp 27K ½W 10%	01121	
R5 and R6	R: fxd comp 5.6K ½W 5%	01121	
R7	R: fxd comp 27K ½W 10%	01121	
R8	R: fxd comp 1K ½W 10%	01121	
R9	R: fxd comp 4.7K ½W 5%	01121	
R10 and R11	R: fxd comp 150K ½W 5%	01121	
R12	R: fxd comp 1K ½W 10%	01121	
R13	R: fxd comp 4.7K ½W 5%	01121	
R14	R: fxd comp 27K ½W 10%	01121	
R15 and R16	R: fxd comp 5.6K ½W 5%	01121	
R17	R: fxd comp 27K ½W 10%	01121	
R18	R: fxd comp 1K ½W 10%	01121	
R19	R: fxd comp 4.7K ½W 5%	01121	
R20 and R21	R: fxd comp 150K ½W 5%	01121	
R22	R: fxd comp 1K ½W 10%	01121	
R23	R: fxd comp 4.7K ½W 5%	01121	
R24	R: fxd comp 27K ½W 10%	01121	
R25 and R26	R: fxd comp 5.6K ½W 5%	01121	
R27	R: fxd comp 27K ½W 10%	01121	
R28	R: fxd comp 1K ½W 10%	01121	
R29	R: fxd comp 4.7K ½W 5%	01121	
R30 and R31	R: fxd comp 150K ½W 5%	01121	
R32	R: fxd comp 1K ½W 10%	01121	
R33	R: fxd comp 4.7K ½W 5%	01121	
R34	R: fxd comp 27K ½W 10%	01121	
R35 and R36	R: fxd comp 5.6K ½W 5%	01121	
R37	R: fxd comp 27K ½W 10%	01121	
R38	R: fxd comp 1K ½W 10%	01121	
R39	R: fxd comp 4.7K ½W 5%	01121	
R40	R: fxd comp 150K ½W 5%	01121	
Q1 thru Q8	Transistors: NPN	49671	2N2102
C1 - C12	C: fxd ppr 0.001μF 100V	13606	6PS-D10
CR1 thru CR16	Diodes	80368	1N198

PC Bd. E95087 - Display Storage

Ref Desig.	Description	Manufacturer (FSCM Code #)	Part Number
R1 thru R10	R: fxd comp 3.9K ½W 5%	01121	
CR1 thru CR20	Diodes	80368	1N198
Q1 thru Q10	Silicon controlled rectifiers	24446	C6A

PC Bd. E95091 - ST/KP & Gate

Ref Desig.	Description	Manufacturer (FSCM Code #)	Part Number
R1	R: fxd comp 10Ω 10% ½W	01121	
R2	not used		
R3	R: fxd comp 20K ½W 10%	01121	
R4	R: fxd comp 2.7K ½W 10%	01121	
R5	R: fxd comp 3.9K ½W 5%	01121	
R6	R: fxd comp 10Ω 10% ½W	01121	
R7	not used		
R8	R: fxd comp 20K ½W 10%	01121	
R9	R: fxd comp 2.7K ½W 10%	01121	
R10	R: fxd comp 3.9K ½W 5%	01121	
R11	R: fxd comp 4.7K ½W 5%	01121	
R12	R: fxd comp 150K ½W 5%	01121	
R13	R: fxd comp 10Ω ½W 10%	01121	
R14 and R15	R: fxd comp 27K ½W 10%	01121	
R16	R: fxd comp 4.7K ½W 10%	01121	
R17	R: fxd comp 1K ½W 10%	01121	
R18	R: fxd comp 150K ½W 5%	01121	
R19 and R20	R: fxd comp 5.6K ½W 5%	01121	
R21	R: fxd comp 100Ω ½W 10%	01121	
CR1 thru CR11	Diodes	80368	1N198
CR12 and CR13	Diodes	80368	1N2069
C1 and C2	C: fxd ppr 0.05μF 100V	13606	2PS-S50
C3	C: fxd ppr 0.01μF 100V	13606	4PS-S10
C4	C: fxd ppr 0.001μF 100V	13606	6PS-D10
K1 and K2	Relays: SPDT Reed	94696	W-103MPCX-4
Q1	Transistor: PNP	01295	2N1375
Q2	Transistor: silicon controlled rect.	07716	2N1595
Q3	Transistor: PNP	01295	SN1375
Q4	Transistor: silicon controlled rect.	07716	2N1595
Q5 and Q6	Transistor: NPN	49671	2N2102

PC Bd. E95093 - Selective Detector

Ref Desig.	Description	Manufacturer (FSCM Code #)	Part Number
FR or FQ	Relay SPDT Reed	94696	W103MPC4-4
L1	Coil adjustable: 266 mH	18043	Special
R1	R: fxd comp 33K $\frac{1}{2}$W 5%	01121	
R2	R: fxd cmp 220K $\frac{1}{2}$W 10%	01121	
R3	R: fxd comp 3.3K $\frac{1}{2}$W 5%	01121	
R4	R: fxd comp 200K $\frac{1}{2}$W 5%	01121	
R5	R: fxd comp 3.3K $\frac{1}{2}$W 5%	01121	
R6	R: fxd comp 110Ω $\frac{1}{2}$W 5%	01121	
R7	R: fxd comp sel val		
R8	R: fxd comp 47Ω $\frac{1}{2}$W 10%	01121	
R9	R: fxd comp 10K $\frac{1}{2}$W 10%	01121	
R10	R: fxd comp 4.7K $\frac{1}{2}$W 5%	01121	
R11	not used		
R12	R: fxd ww 900Ω 3W 5%	13606	
R13 and R14	R: fxd comp 1.2K $\frac{1}{2}$W 10%	01121	
R15	R: var comp 75K	90201	MTC-1
R16	R: var comp 5K	90201	MTC-4
R17	R: fxd comp 10K $\frac{1}{2}$W 10%	01121	
TH1	Thermistor	83186	IIE-2
CR1 and CR2	Diode	80368	1N198
CR3	Diode	80368	1N2069
CR4	Diode: zener	15873	1N3029
C1	C: fxd elect 20μF 50V	13606	TE-1305
C2	C: fxd ppr 0.47μF 80V	13606	192P4749R8
C3 and C4	sel val		
C5 and C6	C: fxd elect 20μF 50V	13606	TE-1305
C7	C: fxd elect 5μF 50V	13606	TVA-1303
C8	C: fxd ppr 0.1μF 75V	71590	DDA-104
C10	C: fxd mica 820μμF	84171	CM15E821J
C9	C: fxd elect 100μF 50V	13606	TVA-1310
C11	C: fxd ppr 0.47μF 25V	13606	5C11
Q1 thru Q4	Transistor: PNP	01295	ZN1375

PC Bd. E95100 - Key Pulse to Decimal Converter

Ref Desig.	Description	Manufacturer (FSCM Code #)	Part Number
R1 thru R10	R: fxd comp 2.7K $\frac{1}{2}$W 10%	01121	
CR1 thru CR50	Diodes	80368	1N198
CR51	Diode: zener	15873	1N748A

PC Bd. E95106 - Gate Voltage 4-Volt Bias Card

R1	R: fxd comp 2K $\frac{1}{2}$W 5%	01121	
R2	R: fxd comp 33K $\frac{1}{2}$W 5%	01121	
R3 and R4	R: fxd comp 20K $\frac{1}{2}$W 5%	01121	
R5	R: fxd ww 1K 5% 3W	13606	242E1025
R6	R: fxd ww 1.8K 3W 5%	13606	242E1825
R7	R: fxd comp 1K 3W 10%	01121	
R8	R: 1Ω 1W	01121	
C1	C: fxd ppr 2.0μF 150V	13606	121P2
C2	C: fxd elect 100μF 25V	13606	TVA-1207
CR1 and CR2	Diodes	80368	1N198
CR3	Diode: zener	15873	1N748A
Q1 and Q2	Transistor: NPN	49671	2N2102
Q3 and Q4	Transistor: PNP	12143	2N1136A
K1	Relay: SPST Reed	71482	CRZ1056T
	Heat Sink	05820	680-75F

Main Assembly

Ref Desig.	Description	Manufacturer (FSCM Code #)	Part Number
R1 thru R6	R: fxd ww 600Ω 5W 5%	44655	4614
R7	R: fxd comp 100Ω ½W 10%	01121	
R8	R: fxd comp 10K ½W 10%	01121	
R9	R: fxd comp 36K ½W 5%	01121	
R10	R: fxd comp 18K ½W 5%	01121	
R11	R: fxd ww 1.2K 3W 5%	13606	242E1225
R12	R: fxd ww 900Ω 3W 5%	13606	242E9015
R13	R: var ww 10K	12697	CM29780NP
R14	R: fxd comp 600Ω 1%	07716	CEC
R15 and R16	R: var ww 25K ½W 10%	71590	HML25K
R17	R: fxd comp 470Ω ½W 10%	01121	
R18	R: fxd comp 10K ½W 10%	01121	
R19 and R20	not used		
R21	R: var ww 400Ω	71590	WW401
R22 thru R31	not used		
R32 and R33	R: var ww 10K	44655	CU-1031
R34 thru R47	R: fxd ww 150Ω 10W 5%	13606	247E1515
R48 thru R83	not used		
R84 thru R86	R: fxd comp 200Ω ½W 5%	01121	
C1 and C2	C: fxd elect 500μF 25V	13606	TVA1209
C3	C: fxd ppr 0.5μF 200V	00656	P8292ZNR
C4	C: fxd elect 100μF 50V	13606	TVA 1310
C5	C: fxd ppr 2.0μF 150V	13606	121P2
C6 and C7	not used		
C8	C: fxd ppr 0.1μF 75V	71590	DDA 104
C9 thru C12	not used		
C13 and C14	C: fxd ppr 0.5μF 150V	00656	P8292ZNR
C15	C: fxd ppr 1.0μF 200V	13606	155P
C16	C: fxd elect 25μF 50V	13606	TE 1305
CR1	Diode: protective	24446	1N1204A
CR2 and CR3	Diodes: zener 18V	12954	1N1607
CR4	Diode	80368	1N2069
CR5	Diode	80368	1N198
CR6 thru CR38	Diodes	80368	1N2069
Q1	Transistor: PNP	12143	2N1136A
Q2	Transistor: NPN	49671	2N2102
S1	S: rotary 7 pos 5 pole	71590	PA-245840
S2	S: rotary 4 pos 2 pole	71590	PA 1003
S3	S: toggle SPST	04009	81015-K
S4	S: turnbutton 2 pos	82389	11206-L
S5	S: toggle DPST	04009	81027-CB

Main Assembly (cont.)

Ref Desig.	Description	Manufacturer (FSCM Code #)	Part Number
S6	S: rotary 3 pos 4 pole	71590	PA 1012
S7	not used		
S8	S: pushbutton	82389	903
S9	S: rotary 4 pos 6 pole	71590	PA 1021
S10	S: toggle SPST	04009	81015-K
J1 thru J7	Jack: telephone	82389	5J1329
J8 and J9	Jack: telephone	82389	444B
J10 thru J13	Jack: telephone	82389	5J1329
J14	Jack: telephone	82389	M-443-B
LP1 thru LP10	Pilot Lamp Assembly	72619	105-4428-722
K1	Relay: SPDT	77342	RS5D 2500
RST	Relay: 4PDT	04773	PE-16036-B11
CO-1	Relay: 8PDT	04773	PE-1685-B13
CO-2	Relay: 8PDT	04773	PE-1685-B13
A	Relay: DPDT	04773	PR-1610-A4
P1	Connector: female	91662	00-8016-056-000
P2	AC Receptacle	74545	7595
P2	AC Plug	74545	7593
P3	Pin Housing	04618	1-480319-0
P3	Socket	04618	1-480318-0
P4	Plug Assembly	82877	16415
XF1	Fuseholder	71400	HKP
F1	Fuse	71400	AGC-5
	Socket 8C 2/unit	04773	PP-50392-2
	Socket 4C 1/unit	04773	PP-50391-1
	Cover 8C 2/unit	04773	PD-4962-1
	Cover 4C 1/unit	04773	PD-4961-1
	Readouts	24138	1011/0820
	Level Meter	06555	4814-00
	Speaker	74199	25A07
	AC Cord	70903	17236
	Knob 3/unit	75376	645-3L-BB
	Knob 4/unit	75376	647-3L-BB
	Knob 1/unit	75376	648-3L-BB
	Muffin fan	82877	

Buffer/Amplifier Bd.

Ref Desig.	Description	Manufacturer (FSCM Code #)	Part Number
R1 thru R10	not used		
R11	R: fxd ww 1.2K 3W 5%	13606	242E1225
R12	R: fxd ww 900Ω 3W 5%	13606	240E9015
R13 thru R49	not used		
R50 and R51	R: fxd comp 100K ½W 10%	01121	
R52	R: fxd comp 4.7K ½W 10%	01121	
R53	R: fxd comp 3K ½W 5%	01121	
R54	R: fxd comp 2.4K ½W 5%	01121	
R55	R: var ww 2.5K ½W 5%	12697	CM21616NP
R56	R: sel val	01121	
R57	R: fxd comp 2.4K ½W 5%	01121	
R58	R: var ww 2.5K ½W 5%	12697	CM21616NP
R59	R: sel val		
R60	R: fxd comp 2.2K ½W 5%	01121	
R61	R: var ww 2.5K ½W 5%	12697	CM21616NP
R62	R: sel val		
R63	R: fxd comp 1.5K ½W 10%	01121	
R64	R: var ww 2.5K	12697	CM21616NP
R65	R: sel val		
R66	R: fxd comp 82Ω ½W 10%	01121	
R67	R: fxd comp 150Ω ½W 10%	01121	
R68 and R69	R: fxd comp 100K ½W 10%	01121	
R70	R: fxd comp 4.7K ½W 10%	01121	
R71	R: fxd comp 12K ½W 10%	01121	
R72	R: fxd comp 470K ½W 10%	01121	
R73	R: fxd comp 10K ½W 10%	01121	
R74	R: fxd comp 4.7K ½W 10%	01121	
R75	R: fxd comp 3.9K ½W 5%	01121	
R76	R: fxd comp 150Ω ½W 10%	01121	
R77	R: fxd comp 470Ω ½W 5%	01121	
C4	C: fxd elect 100μF 50V	13606	TVA 1310
C5	C: not used		
C6 and C7	C: fxd ppr 0.1μF 75V	71590	DDA-104
C8 thru C12	C: fxd elect 20μF 25V	09653	APD-046
C1 thru C3	not used		
T1	Transformer	00348	MT7-FB
Q1 thru Q4	Transistor: PNP	01295	2N1375
RV1 and RV2	Varistor	81071	5V-1

Monitor/Amplifier Bd.

Ref Desig.	Description	Manufacturer (FSCM Code #)	Part Number
R1 thru R3	not used		
R4	R: fxd comp 360K $\frac{1}{2}$W 5%	01121	
R5 and R6	R: fxd 33K $\frac{1}{2}$W 5%	01121	
R7	R:fxd comp 2.7K $\frac{1}{2}$W 5%	01121	
R8	R: fxd comp 2.7K $\frac{1}{2}$W 5%	01121	
R9	not used		
R10	R: fxd comp 33K $\frac{1}{2}$W 5%	01121	
R11	R: fxd comp 360K $\frac{1}{2}$W 5%	01121	
R12	R: fxd comp 2.7K $\frac{1}{2}$W 5%	01121	
R13	R: fxd comp 300Ω $\frac{1}{2}$W 5%	01121	
R14	R: fxd comp 33K $\frac{1}{2}$W 5%	01121	
R15	R: fxd comp 120K $\frac{1}{2}$W 10%	01121	
R16	R: fxd comp 12K $\frac{1}{2}$W 10%	01121	
R17	R: fxd comp 10K $\frac{1}{2}$W 10%	01121	
R18	R: fxd comp 200Ω $\frac{1}{2}$W 5%	01121	
R19	R: fxd comp 1.3K $\frac{1}{2}$W 5%	01121	
R20	R: fxd comp 5.1K $\frac{1}{2}$W 5%	01121	
R21	R: fxd comp 39K $\frac{1}{2}$W 5%	01121	
R22	R: fxd comp 910Ω $\frac{1}{2}$W 5%	01121	
R23	R: fxd comp 62Ω $\frac{1}{2}$W 5%	01121	
R24 and R25	R: fxd comp 1K 3W 5%	13606	242E1025
C1 and C2	C: fxd ppr 0.1μF 75V	71590	DDA 104
C3	C: fxd ppr 0.47μF 25V	09653	5C11
C4	C: fxd elect 20μF 25V	09653	APD-046
C5 and C6	C: fxd ppr 0.1μF 75V	71590	DDA-104
C7	C: fxd ppr 0.47μF 25V	13606	5C11
C8	C: fxd elect 20μF 25V	09653	APD-046
C9	C: ppr 0.5μF 200V	00656	P8292 [illegible]N12
C10	C: fxd ppr 0.015μF 100V	13606	4PS-S15
C11	C: fxd elect 100μF 50V	13606	TVA-1310
T1 and T2	Transformer: input	00348	MTM-FB
T3	Transformer:output	81095	S1-X
Q1 and Q2	Transistor: PNP	01295	2N1375
Q3 thru Q5	Transistor: NPN	49671	2N2102

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